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Draft Land and Resource Management Plan for the Coconino National Forest

Coconino, Gila, and Yavapai Counties, Arizona

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Preface

This draft land and resource management plan (also called the proposed plan) has been released for 90-day public comment along with the draft environmental impact statement (DEIS).

The proposed plan aims to promote responsible land management for the Coconino National Forest (Coconino NF) based on useful and current information and guidance and would replace the existing forest plan, originally adopted in 1987. Land management planning guides the Forest Service in fulfilling its responsibilities for the stewardship of the forest to best meet the needs of the American people. This plan will provide strategic guidance and information for project and activity decisionmaking on the Coconino NF for approximately the next 15 years.

The proposed plan for the Coconino NF was developed collaboratively and is the result of 6 years of iterative discussions and feedback. Comments received were used to modify and refine the draft plan, as well as to identify issues and alternatives evaluated in the DEIS.

Both the proposed plan and the DEIS can be found electronically on the Coconino NF Web site at:

http://www.fs.usda.gov/detail/coconino/landmanagement/planning/

Detailed assessments, evaluations, reports, and documents associated with development of the plan can also be viewed and downloaded from the Coconino NF Forest Plan Revision Web site.

Please submit your comments on this proposed plan and the DEIS to:

Coconino National Forest
Attention: Yewah Lau, Forest Planner
1824 S. Thompson Street
Flagstaff, AZ 86001
(928) 527-3411 or Fax (928) 527-3620

Hand delivered comments can be submitted to the Coconino NF Supervisor's Office from 8:00 a.m. to 12:00 p.m. (noon) and 12:30 p.m. to 4:30 p.m. Monday through Friday, excluding holidays.

Electronic comments must be submitted in a format such as an email message, plain text (.txt), rich text format (.rtf), or Word (.doc or .docx) to the following email address:

coconino_national_forest_plan_revision_team@fs.fed.us

Electronic comments may also be submitted to the Coconino NF "Contact Us" Web submission site: http://go.usa.gov/gnuj

As this is a nonspecific commenting format, we ask that commenters indicate "Forest Plan Revision Comments" in the subject line of their comment.

Comments received in response to this solicitation, including names and addresses of those who comment, will be considered part of the public record and available for public inspection.

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Commonly Used Acronyms

AMS – Analysis of the Management Situation

AZGFD – Arizona Game and Fish Department

BLM – Bureau of Land Management

BMP – Best management practice

d.b.h. – Diameter at breast height

ESA – Environmental study area

GIS – Geographic Information System

HUC – Hydrologic unit code

MA – Management area

MSO – Mexican spotted owl

MVUM – Motor vehicle use map

NEPA – National Environmental Policy Act

NF – National forest

NFMA – National Forest Management Act

NFS – National Forest System

NPS – National Park Service

OHV – Off-highway vehicle

ORV – Outstandingly remarkable values

P – Primitive

PAC – Protected activity center

PFA – Post-fledgling family area

PFC – Proper functioning condition

PNVT – Potential natural vegetation type

RNA – Research natural area

ROS – Recreation opportunity spectrum

SIO – Scenic integrity objective

SPNM – Semiprimitive nonmotorized

TES – Terrestrial ecosystem survey

USFWS – U.S. Fish and Wildlife Service

WOS – Wilderness opportunity spectrum

WUI – Wildland-urban interface

Chapter 1. Background

Introduction

The Coconino National Forest Land and Resource Management Plan (hereinafter referred to as the forest plan or simply the plan) covers the National Forest System (NFS) lands within the boundary of the Coconino National Forest (Coconino NF or the forest), excluding land designated as experimental forest.

The Coconino NF is located in north-central Arizona (figure 1) in Coconino, Gila, and Yavapai Counties and encompasses approximately 2 million acres. The Coconino NF is managed by the Forest Service, an agency of the U.S. Department of Agriculture (USDA). Ranger district offices are located in Flagstaff, the Village of Oak Creek, and Blue Ridge. The forest supervisor's office is located in Flagstaff.

Purpose of the Land Management Plan

This plan aims to promote responsible land management for the Coconino NF based on useful and current information and guidance. Land management planning guides the Forest Service in fulfilling its responsibilities for the stewardship of the forest to best meet the needs of the American people.

This plan provides strategic guidance and information for project and activity decisionmaking on the Coconino NF for approximately the next 15 years. The plan is intended to provide additional direction not already provided by existing law, regulation, or policy. This plan does not include site-specific project and activity decisions. Project and activity decisions are analyzed separately. All project and activity decisions, however, must comply with the guidance provided by this plan unless amendments are made to the plan that allow for deviation.

The plan provides a framework that contributes to sustaining native ecological systems by managing toward appropriate conditions that support native plant and animal diversity. The plan integrates forest restoration; watershed protection; resilience to changing climate; wildlife conservation; and contributions to social and economic values, goods, and services. The plan honors the continuing validity of private, statutory, or pre-existing rights.

Figure 1. Vicinity map of the Coconino NF

Summary of the Analysis of the Management Situation

The "Analysis of the Management Situation" (AMS) (Forest Service, 2010a), published in May 2010, highlights the social, economic, and ecological conditions and trends in and around the Coconino NF, as detailed in the forest's "Economic and Social Sustainability Assessment" (ESSA) (Forest Service, 2008), the "Ecological Sustainability Report" (ESR) (Forest Service, 2009), as well as the "Recreation, Grazing, Minerals, and Timber Demand Report" (Forest Service, 2010c). The AMS used these key

findings, along with public input[1], to identify areas in existing plan direction that do not provide adequate guidance for the present and future, and it attempts to consider potential implications of those plan needs for change to other resources. The draft AMS and its supporting materials were used by the Coconino NF leadership team to determine the initial scope of plan revision topics.

Social and economic trends and conditions show increasing demand on the Coconino NF for a wide variety of human uses. Ecological conditions and trends demonstrate there are current and future threats to the sustainability of some of the forest's ecosystems and the species they support. Identified plan needs for change are summarized below and grouped into three broad topics: Recreation, Community-Forest Interaction, and Maintenance and Improvement of Ecosystem Health.

Recreation

Condition and Trends

Recreational use of the Coconino NF has changed significantly since the 1987 "Coconino National Forest Land and Resource Management Plan" (1987 plan) (Forest Service, 1987a) was developed. Some of the trends and conditions related to recreation include: increased use of developed recreation areas; changing demographics; increased conflicts in social values, culture, and expectations tied to public lands[2]; new types of recreation; the adoption of a new scenery management system; increased recognition of tribal cultural uses and values; and pressures on riparian, wilderness, and other special areas.

Needs for Change

In order to allow for changing trends and conditions, the revised plan needs to:

- Update desired conditions and other plan components for recreation and scenery management where guidance is partial or absent in the 1987 plan.
- Update the plan components for existing special areas.
- Incorporate special area recommendations and related plan components into the revised plan.

Community-Forest Interaction

Condition and Trends

Relationships with the surrounding communities have changed significantly since the 1987 plan was developed. Some of the trends and conditions related to community-forest interaction include: a shift from a commodity-based (e.g., timber, mineral development) to a service-based (e.g., recreation) economy; the influence of forest management activities on the local economy and environment; population growth and loss of forest access or open space; and increased demand for community infrastructure.

[1] See appendix B, Public Collaboration and Involvement/Other Planning Efforts, found in the "Draft Environmental Impact Statement for the Coconino National Forest Land and Resource Management Plan" (Forest Service, 2013).

[2] For example, between those who believe that only recreational activities that are less disruptive of nature (wildlife viewing or hiking) should occur on the forest and those who believe the forest should be equally available for all recreation types (hiking, off-road vehicle use, large group events).

Needs for Change

In order to allow for changing trends and conditions, the revised plan needs to:

- Update plan language to acknowledge open space values.
- Update plan language to acknowledge potential future community growth and expansion desires.
- Update guidance on energy and mineral development.
- Provide guidance related to forest products and consideration of culturally important forest products.
- Clarify regulatory authorities relating to air quality and include approaches for addressing smoke and fugitive dust emissions.
- Review and update plan guidance on communication sites.

Maintenance and Improvement of Ecosystem Health

Condition and Trends

Since development of the 1987 plan, there is new knowledge of forest ecosystems, and the emphasis of forest management has shifted from timber outputs to the maintenance and improvement of ecosystem health. Some of the trends and conditions related to ecosystem health include: recognition of each ecological resource on the forest, from soil to wildlife; forest resilience; changed frequency and severity of natural disturbances in fire-adapted ecosystems; decline of aspen; loss of understory species; lack of current plan direction regarding rarer ecosystems (e.g., tundra, spruce-fir, riparian); and susceptibility to uncharacteristic disturbances (e.g., fire, drought, insects and disease), climate change, invasive species, and human-caused habitat fragmentation.

Needs for Change

In order to allow for changing trends and conditions, the revised plan needs to:

- Update desired conditions and objectives for soil resources.
- Integrate and update management direction for riparian, aquatic, and water resources.
- Incorporate desired conditions that reflect the composition, structure, and natural disturbance attributes appropriate for the different ecosystems, and integrate desired conditions across different resource areas.
- Address invasive flora and fauna.
- Ensure plan components address concerns of forest analysis species[3] and their habitat.
- Address the importance of habitat connectivity.
- Address strategies to address effects of climate change.

[3] Forest analysis species are plant, animal, and aquatic species considered for analysis during the forest plan revision process.

Other Needs for Change

Direction in the existing 1987 plan that is still current and timely will be carried forward into the revised plan, but other direction may be modified or removed for the following reasons:

- Administrative functions, such as budgeting, are not the desired conditions of land and resources.
- Duplications or conflicts exist with direction found in existing law, regulation, or policy.
- Plan components are based on outdated information, such as policies, schedules of activities, or science.
- The format is inconsistent and hard to use.

New information and changing conditions will necessitate changes in management. Iterative and adaptive planning may facilitate the incorporation of new information into potential plan amendments. Under the National Forest Management Act (NFMA) of 1976 (P.L. 94-588), projects and activities must be consistent with the plan.

Climate Change Concerns

The revised plan includes updated plan language for soil, riparian, aquatic, and water resources; changing climate; habitat connectivity; and noninvasive animals and grasses and other vegetation.

With respect to climate change[4], observed concentrations of greenhouse gases are projected to increase, and climate change may intensify the risk of ecosystem change for terrestrial and aquatic systems, thereby affecting ecosystem structure, function, and productivity. Because the effects of climate change are difficult to discern in the short term from climate variability and other contributing factors, it is addressed as an integrated part of this plan, rather than as a distinct set of plan direction. For example the desired conditions for all vegetation types state, "[v]egetation conditions are resilient to the frequency, extent, and severity of disturbances, such as fire in fire-adapted systems and flooding in riparian systems, and climate variability."

Improved ecosystem function (i.e., progress toward desired conditions) is presumed to improve the resiliency of ecosystems to withstand changes in disturbance patterns, such as changes in frequency, intensity, timing, and spatial extent, as a result of climate change. The nature of the revised plan to manage toward desired conditions, regardless of current or changing conditions (e.g., climate change), is intended to allow management of the forest to adapt as necessary to continue moving toward ecological and social desired conditions. Although the revised plan monitoring program does not include components to specifically monitor climate change, it can track the forest's progress toward desired conditions and whether management activities are promoting resilient ecosystems, as well as provide indications about whether influences of climate change are hindering progress toward desired conditions.

Current conditions and trends related to climate change may be found in various documents used to develop and evaluate the revised plan, including the ESR, the AMS, and other documents

[4] Climate change is a change in overall climate or its variability from season to season, persisting for an extended period (typically decades or longer). Climate change may be due to natural processes or human-caused changes in the composition of the atmosphere or in land use. The United Nations Framework Convention on Climate Change makes a distinction between "climate change" which is attributable to human activities altering the atmospheric composition and "climate variability" which is attributable to natural causes (2011).

contained in the project record. The "Draft Environmental Impact Statement for the Coconino National Forest Land and Resource Management Plan" (DEIS) also evaluates climate change with the potential effects of future management under this plan and its alternatives.

Plan Content

This plan includes "plan decisions" and "other content." Once plan decisions are approved, any substantive changes to them will require a plan amendment. A change to "other content" may be made using an administrative correction process. Administrative corrections are also used to make nonsubstantive changes to plan decisions such as data and map corrections, or updates and typographical errors. The public will be notified of all plan amendments and administrative corrections.

Plan Decisions

Plan decisions are the equivalent of plan components. They include goals (hereafter identified as desired conditions), objectives, standards, guidelines, suitability, and monitoring.

- **Desired conditions** (or goals) set forth the desired social, economic, and ecological goals of the Coconino NF. They attempt to paint a picture of what we (the public and the Forest Service) desire the forest to look like or the goods and services we desire it to provide. Desired conditions are generally expressed in broad, general terms; however, more specificity may be added to clarify the intent. Desired conditions are timeless in that there is no specific date by which they are to be completed. They may only be achievable over a long timeframe (e.g., several hundred years). In some cases, a desired condition matches the current condition, so the goal is to maintain the current condition.

  Desired conditions are the focus of this plan; management of the Coconino NF's resources will be directed toward achieving the desired conditions. Desired conditions are the basis for the other plan components and describe the framework for future projects and activities. They are aspirations and not commitments or final decisions approving projects. Projects and site-specific activities must be consistent with desired conditions (see the "Guiding Future Projects, Program Plans, and Assessments" section below). A plan amendment would be required if project level activities deviated from the progress toward long-term achievement of desired conditions.
- **Objectives** are concise, time specific statements of measurable, anticipated results that respond to desired conditions. Activities specified in objectives are intended to help make progress toward achieving desired conditions and represent just some of the outcomes or actions expected to accomplish movement toward desired conditions. Not every action or objective the Coconino NF may do is identified in the plan, just the primary ones.

  Objectives are written based on recent trends, current and anticipated staffing levels, and anticipated budgets. Changes in environmental conditions, budgets, and other factors during the plan period may result in a need to re-evaluate plan objectives.
- **Standards** are constraints upon project and activity design. A standard is an absolute requirement to be met in the design of projects and activities. A project or activity is consistent with a standard when its design is in accord with the explicit provisions of the standard; variance from a standard is not allowed except by plan amendment.
- **Guidelines** are sideboards that guide management activities and provide specifications that a project or activity would adopt unless there is a compelling or defensible reason to

vary from the guideline. Deviation from the explicit provisions of the guideline is permitted without a plan amendment, as long as the intent of a guideline is met. Deviation from the explicit provisions of a guideline, if it is meeting the intent of the guideline, must be documented in the project record. **Projects that deviate from a guideline's intent must be accompanied by a plan amendment that would allow for the deviation.**

- **Suitability** describes the appropriateness of applying certain resource management practices to a particular area of land. A unit of land may be suitable for a variety of individual or combined management practices. Where current management is not consistent with suitability determinations in this plan, future decisions should adjust activities to be consistent with suitability determinations and associated desired conditions stated in this plan.
- **Management areas** are lands that have management direction that is more specific than forestwide and include lands designated as special areas by Congress or another delegated authority. Special areas are identified because of their unique or special characteristics. Examples include: wilderness, research natural areas, scenic byways, and national recreation trails.
- **Monitoring** is used to determine the degree to which on-the-ground management is maintaining or making progress toward desired conditions. The monitoring plan includes questions and performance measures designed to inform implementation and effectiveness of plan decisions. It helps ensure that the plan remains adaptive, in that new knowledge and information can be analyzed and the plan changed accordingly.

Plan decisions are contained in chapters 2 through 5. In chapters 4 and 5, plan decisions are displayed within tables 14 through 21. In chapters 2 and 3, a code is used to reference and visually distinguish plan decisions more easily. Abbreviations are used in each code to identify: (1) if a plan decision applies forestwide or within a particular management area or special area; (2) resource area; and (3) type of plan decision. The last part of each code contains a number which is displayed in the left margin. For example "FW-Air-Qual-DC-1" refers to the first listed desired condition for air quality; "MA-FlagN-O-2" refers to the second listed objective for the Flagstaff Neighborwoods Management Area; and "SA-WSR-Verde-S-1" refers to the first listed standard for the Verde Wild and Scenic River, a designated special area (see figure 2 for a visual example).

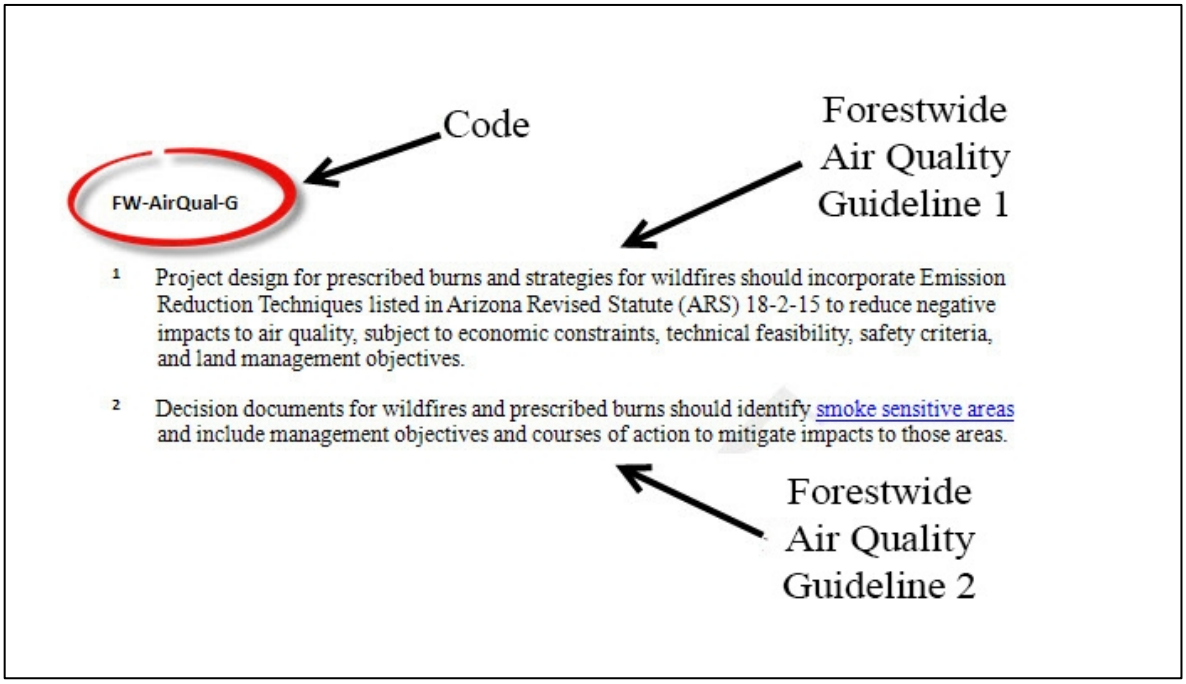

Figure 2. Visual example of plan decision code

Other Content

Besides the plan decisions mentioned above, the plan also contains other content. Other content includes chapter 1, certain sections in chapters 3 and 4 (i.e., background, management approaches, and related plan content), and all appendices. These sections are meant to provide information and assist in understanding the larger management context. These sections are not intended to be mandatory direction.

The **background** section provides a narrative regarding resource conditions. The primary sources for the information found in this section are derived from the AMS, ESR, ESSA, and several resource evaluations.

The **management approach** sections identify probable management actions to accomplish desired conditions and objectives. Management approaches describe the priorities and expectations for future program coordination. Partnerships and collaborative arrangements are also included as part of the management approaches for accomplishing desired conditions. Management approaches are strongly influenced by recent trends, past experiences, anticipated staffing levels, and short-term budgets. Decisions about what projects are actually proposed and approved, as well as details of project design, are determined by public involvement, science, and professional experience at the project or activity level.

The **related plan content** section lists other main portions of the plan that contain related information; however, this is not an exhaustive list.

The plan includes several **maps** throughout the document, including in appendix A. Some maps display the potential natural vegetation types (PNVTs) on the forest. The PNVT mapping is based

on terrestrial ecosystem survey (TES) data, and the acres and distribution of PNVTs are based on this coarse filter information. Since the transition between the potential natural vegetation types (PNVTs) is highly variable, there may be some variability where some areas do not match the map of the PNVTs. In these instances, proposed activities are governed by plan components of the PNVT that most accurately depicts that area. Project level or site-specific analysis may refine PNVT information in the corporate Geographic Information System (GIS) data in the future. The following statement applies to all maps found within the plan:

> *The USDA Forest Service uses the most current and complete data available. GIS data and product accuracy may vary. Using GIS products for purposes other than those for which they were intended may yield inaccurate or misleading results. The USDA Forest Service reserves the right to correct, update, modify, or replace GIS products without notification. This map is not a legal land line or ownership document. Public lands are subject to change and leasing, and may have access restrictions; check with local offices. Obtain permission before entering private land.*

The **appendix** provides additional information to the plan and includes: maps, an overview of the proposed and probable management practices, a crosswalk of common and scientific species names, a list of other sources of information (e.g., relevant laws, regulations, and policies), and an index of documents that support the plan.

Plan Organization

This plan is organized as follows:

Chapter 1. Background — briefly describes the Coconino NF, the analysis of the management situation, the purpose of the plan, plan content, and plan organization. For a quick preview of the plan structure, glance at the contents pages. This chapter does not contain any plan decisions.

Chapter 2. Forestwide Management — contains plan decisions and other content that are applicable forestwide.

Chapter 3. Management Areas and Special Areas — contains plan decisions and other content that is applicable to particular management areas, in addition to forestwide direction.

Chapter 4. Suitable Uses — describes the appropriateness, or suitability, of certain resource management practices (uses) across the forest.

Chapter 5. Monitoring Strategy — contains the monitoring plan decisions and provides a framework for subsequent monitoring and evaluation.

List of Preparers — contains a list of the specialists who contributed to development of the plan.

Glossary — contains definitions for technical terms used in the plan.

References — contains a list of citations for documents referenced in the plan.

Appendix — consists of multiple parts and supplements information contained in the plan.

Hypertext is used throughout the plan; it allows the user of the electronic version of this plan to click on a word (indicated by blue underlined text, for example glossary) and be redirected to

another area of the plan or an external reference. Users can then click on the word again and be redirected back to their original location. The first occurrence of words that are found in the glossary are hyperlinked.

Guiding Future Projects, Program Plans, and Assessments

During implementation, management activities affecting the Coconino NF must be consistent with the plan. This consistency is achieved in the following ways:

- Management activities are developed specifically to achieve the desired conditions (goals) of the plan. To the extent practicable, documentation for such projects should identify the elements of the desired conditions to be achieved by the project. All projects or activities may not contribute to all desired conditions or objectives but rather to a limited subset. Also, some projects designed to contribute to some desired conditions may have consequences considered adverse to the achievement of other desired conditions. In this situation, the responsible official for the project needs to identify and disclose these effects in the project documentation and make a decision that balances these considerations.
- Management activities for projects that are necessary but are not specifically related to one of these elements of the plan (e.g., routine road and facility maintenance) should be briefly evaluated to assess if they conflict or impede contribution to the desired conditions or objectives.
- Projects are expected to comply with suitability, standards, and guidelines contained in the plan. The applicable standards, guidelines, and suitability considerations should be identified early in the project planning process. To ensure compliance with the plan, each project should document consistency with these standards and guidelines.

Transition in the Implementation of the Plan

The plan is used as a source of direction for future projects, plans, and assessments. A smooth and gradual transition to the new plan is anticipated, rather than one that forces an immediate re-examination or modification of all contracts, projects, permits, and other activities already in progress. Existing projects will be evaluated and, if necessary, modified to comply with new direction as soon as it is practicable. As new project decisions, contracts, permits, renewals, and other activities are considered, conformance to the new plan direction as described in the previous section is expected.

Future Changes to the Plan

A change to the plan requires either administrative correction or amendment. The following summarizes circumstances that warrant corrections or amendments to the plan:

- **Administrative corrections** are minor changes to the plan that do not substantively affect the management direction or create additional environmental consequences. These minor changes include the following:

- Elements of the plan that are not plan decisions as described in the previous section, "Other Content."
- Corrections and updates of data published in the plan and minor changes to maps.
- Changes in proposed or probable actions expected to occur during the plan period.
- Minor text changes such as typographical errors and clarification of explanatory text.

Unless otherwise required, administrative correction must be initially published as a proposed correction either on the Coconino NF's Web site or in a local newspaper of record. The proposed correction must identify the language or map to be corrected, the proposed correction, and the reason for the correction. The public will have an opportunity to comment on the proposed correction within a 30-day period following publication. After reviewing the comments received, the final correction may be similarly published and the plan corrected.

- **Site-specific plan amendments** occur to allow specific projects or other activities to deviate from certain plan direction. These amendments occur only for a specific area or a specific project. They do not lead to permanent changes in plan language, and if changes are made to management area map layers, they are made only for the area affected. Such amendments are usually proposed with appropriate National Environmental Policy Act (NEPA) analysis for the site-specific project proposal. The procedures for processing a site-specific plan amendment are outlined in the applicable planning regulation.
- **Programmatic plan amendments** permanently change the text and language of the plan decisions identified in the earlier section "Plan Decisions" and any other changes that cannot be addressed through administrative corrections or site-specific plan amendments. The procedures for addressing a programmatic plan amendment are outlined in the applicable planning regulation.

Roles and Contributions of the Coconino NF

The distinctive characteristics of the Coconino NF frame the roles and contributions it provides to the local area, the State of Arizona, the Southwestern Region, and the Nation. The approximately 2 million-acre Coconino NF is located in north-central Arizona and is at the southern end of the Colorado Plateau. The Coconino NF is one of six national forests in Arizona, and it shares borders with the Apache-Sitgreaves, Kaibab, Prescott, and Tonto National Forests; private land; and lands administered by the State and National Park Service. The forest is within a couple miles of the Navajo Nation. (See figure 3.)

The Coconino NF ranges in elevation from 2,600 to 12,633 feet. The north part of the forest is dominated by the San Francisco Peaks, which includes Humphreys Peak, the highest point in Arizona. Numerous cinder hills and volcanoes of the San Francisco Peaks volcanic field are scattered across the northern portion. The Mogollon Rim, a 1,000-foot-high cliff that runs for about 200 miles across central Arizona, delineates the southeast border of the forest. Deep canyons containing several perennial streams dissect the rim. The Verde River forms the southwest boundary of the forest while one of its major tributaries, Sycamore Creek, separates the Coconino from the Kaibab and Prescott National Forests on the west.

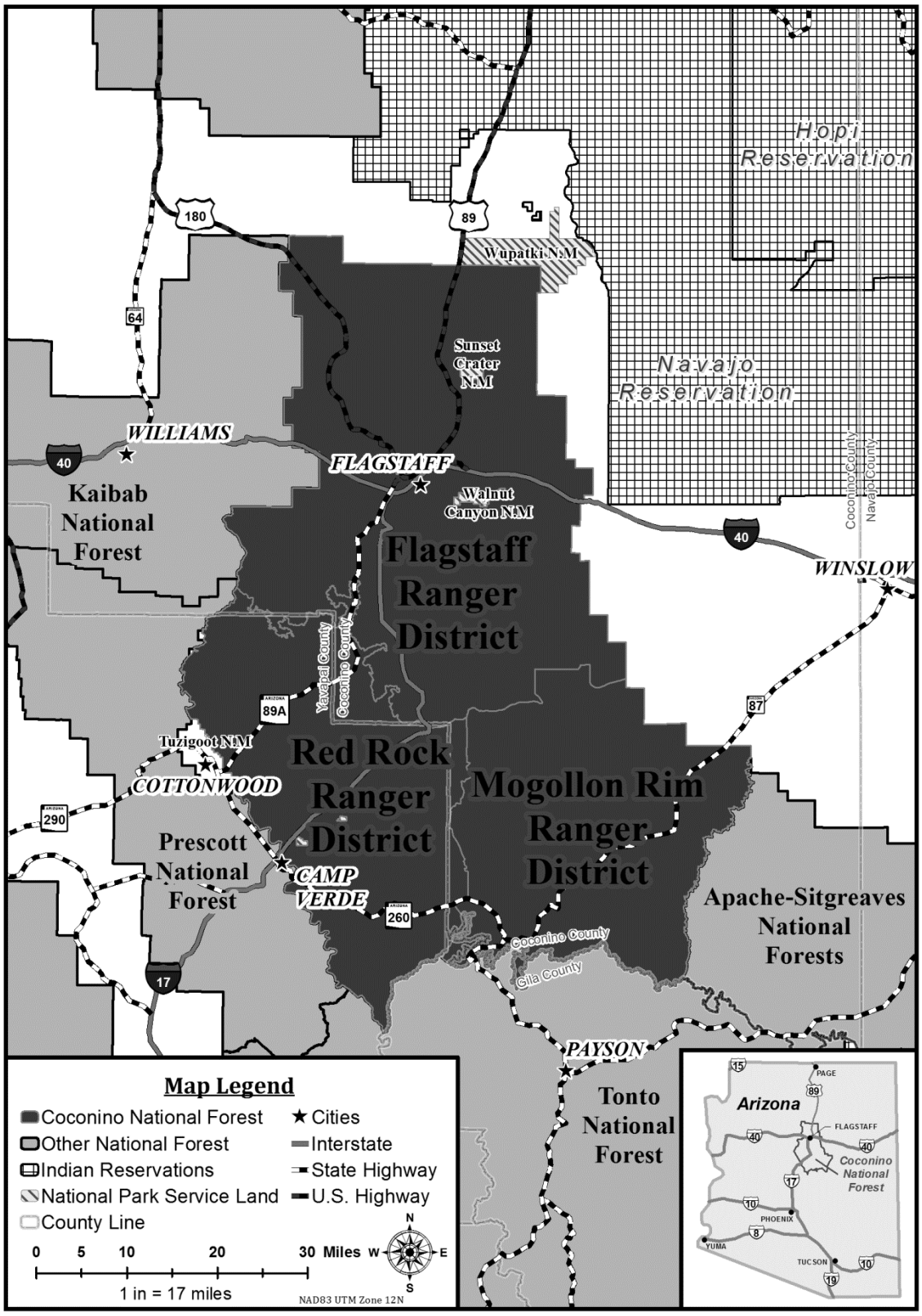

Figure 3. Coconino NF and surrounding lands

The Coconino NF has a high diversity of vegetation communities due to the wide range of elevations, complex topography, and the presence of perennial and ephemeral water. Vegetation communities at the lowest elevations are desert communities and riparian areas supporting cottonwoods and willows, while the highest elevation atop the San Francisco Peaks supports the only alpine tundra in Arizona. In between, there are extensive areas of piñon-juniper vegetation types, ponderosa pine, and mixed conifer vegetation types interspersed with grasslands and scattered pockets of aspen at higher elevations. Riparian vegetation is supported by perennial and intermittent waters.

The Coconino NF contains more water than most of the surrounding landscapes. There are about 224 perennial stream miles on the forest. Mormon Lake is Arizona's largest natural lake. There are 13 reservoirs, constructed primarily for municipal water use, recreation, and livestock. The forest lies mainly in the Verde River and Little Colorado River Plateau groundwater basins. The areas of highest precipitation and groundwater recharge for these basins occur on lands within the Coconino NF. The forest also contains about 78 riparian wetlands totaling about 10,186 acres, the second highest number on National Forest System lands in Arizona. Over 200 springs occur on the forest.

The diverse ecosystems on the Coconino NF provide habitat for a wide array of wildlife, fish, and plants. There are a number of rare species such as the Wupatki Arizona pocket mouse, Chiricahua leopard frog, Little Colorado spinedace, and rare plants like the San Francisco Peaks ragwort and Arizona cliffrose. Fifteen native fish species occur on the forest. Portions of nearly 80 percent of the perennial streams support native fish. Some native fish are only known to occur in this area.

The Coconino NF is a regional, national, and international year-round recreation destination. Visitors are drawn to the diversity of settings provided, including: warm grasslands in the Verde Valley, cool riparian respites in canyons, prominent red rock spires and buttes around Sedona, and snow covered peaks and forests near Flagstaff. Visitors come to the forest seeking a change from summer heat and city living. Many people gravitate to water or snow-based activities. Others enjoy the diverse scenery of red rocks, grasslands, deserts, and cool forests. The activities that see the greatest number of participants are hiking/walking; driving for pleasure; and viewing natural features, wildlife, and archaeological sites.

The top five activities identified are as follows (Forest Service, 2006a, p. 14):

1. Viewing natural features (83.9 percent)
2. Hiking/walking (79.1 percent)
3. Viewing wildlife (70 percent)
4. Relaxing (64.8 percent)
5. Driving for pleasure (54.8 percent)

Visitors enjoy the developed recreation sites throughout the Coconino NF that include the Arizona Snow Bowl ski area, popular lakes, and campgrounds. There are abundant year-round dispersed recreation activities. Ten wilderness areas provide opportunities for solitude and backcountry experiences. Several archaeological sites developed by the forest for public interpretation and an abundance of private sector guided tours display the significant cultural heritage preserved on the forest. Trails and roads provide numerous hiking, biking,

horseback, and motorized vehicle access to natural areas in the forest landscape. Wildlife viewing, big game hunting, and fishing are popular activities. The Coconino NF is a destination for winter activities such as snow play, snowmobiling, skiing, and snowshoeing.

American Indians and ranchers are a significant part of Coconino NF history, and their traditional uses remain an important part of the cultural landscape.

Some additional features that make the Coconino NF unique on a regional and national scale include the following:

- Coconino NF ranges from 2,600 feet in elevation in the Verde Valley to 12,633 feet atop Humphreys Peak. This wide range in elevation makes the forest unique in Arizona, because it contains all major biotic communities except true desert. All of the alpine tundra on National Forest System lands in Arizona is on the Coconino NF.
- Night sky viewing opportunities abound, and four observatories are located within or adjacent to the Coconino NF boundary. In recognition of the area's unique and valuable night sky viewing opportunities, Flagstaff became the world's first international "Dark Sky City."
- The Cinder Lakes volcanic field was used from 1968 to 1973 to train NASA astronauts in the Apollo 11 through Apollo 15 missions. This training was vital to the success of the Apollo program and the first U.S. landing on the moon by Neil Armstrong and Edwin Aldrin in July 1969.
- The Coconino NF manages seven archaeological sites that are open to the public: Sacred Mountain, Honanki, Palatki, V-V and Red Tank Draw Petroglyph sites; Clear Creek Ruins; Old Caves Pueblo; and the award-winning Elden Pueblo Project, one of America's Hands on the Land designated sites. In addition, there are six national monuments (Walnut Canyon, Sunset Crater Volcano, Wupatki, Montezuma Castle, Montezuma Well, and Tuzigoot) and four state parks (Red Rock, Slide Rock, Dead Horse Ranch, and Fort Verde) nearby.
- The Coconino NF has one of the highest natural (i.e., lightning-caused) fire occurrences in the U.S. Over a 23-year period, the forest had the highest natural fire occurrence in the U.S. for 18 years, and it was in the top 6 every year.
- The State of Arizona has designated three streams—Fossil Creek, Oak Creek, and West Fork of Oak Creek—as being outstanding state resources and classified them as Outstanding Arizona Waters.
- The only two designated wild and scenic rivers (WSRs) in Arizona occur on the Coconino NF. The Verde River WSR is shared with the Prescott and Tonto National Forests. The Fossil Creek WSR is shared with the Tonto National Forest. Eleven additional segments in 9 different streams are eligible for inclusion in the National Wild and Scenic Rivers System, including portions of the West Fork of Oak Creek.
- Fossil Creek contains the largest assemblage in Arizona of native fish species in a creek that is free of nonnative fish. In addition, the travertine formation in Fossil Creek is of international significance because it is of similar scale and significance with a handful of travertine systems in China, Afghanistan, Croatia, Italy, Guatemala, and Turkey. Stream chemistry creates travertine formations and gives the stream its unique turquoise color.
- The Coconino NF contains the two largest natural lakes in Arizona: Mormon Lake and Stoneman Lake.

- The Coconino NF has a greater proportion of the perennial stream miles relative to the proportion of watersheds that overlap the forest. Of particular note, the Coconino NF contains 55 percent of the perennial stream miles in the Middle Little Colorado River 4th code watershed, even though only 15 percent of the 4th code watershed is on the forest.
- Oak Creek has the largest number of caddisfly species reported in any drainage in Arizona.
- The Coconino NF has all of Arizona's big game species except buffalo and includes: pronghorn, black bear, bighorn sheep, elk, javelina, turkey, mountain lion, mule deer, and white-tailed deer.
- Several factors make the Coconino NF unique for its bald eagle habitat. Edgar Mearns documented the first bald eagle nest in Arizona at Stoneman Lake in the late 1800s. The largest concentration of bald eagles ever counted in Arizona (120 eagles) was counted on the forest near Mormon Lake. Fifteen to 20 percent of all bald eagles counted in Arizona in the winter occur on the forest. The forest contains seven bald eagle nesting areas.
- Because of the wide range in biotic communities and natural features, the Coconino NF supports a high diversity of bat species. Of the 28 bat species known to occur in Arizona, 19 have been documented on the forest.

The Coconino National Forest's Mission

"Caring for the Land and Serving People" is the Forest Service motto. This translates into sustaining the health, diversity, and productivity of the Nation's forests and grasslands to meet the needs of present and future generations. The overall goal of managing National Forest System (NFS) lands is to sustain the multiple uses of its resources in perpetuity while maintaining the long-term productivity of the land.

The Coconino NF's staff strives to effectively and efficiently manage NFS lands and resources to meet the needs and desires of the public while enhancing the environment.

The Coconino National Forest's Vision

The Coconino NF contains healthy ecosystems with an abundant and diverse flora and fauna. The forest provides a variety of high quality outdoor recreation opportunities and serves as an important part of the rich southwestern scenic and cultural heritage. Historic uses, such as timber harvesting and livestock grazing, continue within sustainable levels and support rural economies.

Chapter 2. Forestwide Management

Introduction

This chapter sets forth plan decisions and other content that apply forestwide. Plan decisions can be visually distinguished and referenced easily in this chapter by a coding system (described in detail in chapter 1 and figure 2) that identifies: (1) where a plan decisions is applicable (forestwide or within a specific management or special area); (2) what resource area is affected by the decision; and (3) what type of plan decision is being made.

See chapter 1 for descriptions of plan decisions (e.g., desired conditions, objectives, guidelines, and standards) and other content (e.g., general description and background, and management approaches). In the event of conflicts with other sections of this plan, the more restrictive plan decision always applies. However, a project or activity-level evaluation may be required to resolve the conflict.

Ecosystems

Air

Air Quality

General Description and Background for Air Quality

Smoke occurs during wildfires, and when fire is used to reduce fuels and restore fire-adapted ecosystems, it is the primary air emission from forest management activities. Management activities that use fire are likely in the short term to increase atmospheric particulates.

The Environmental Protection Agency (EPA), as required by the Clean Air Act of 1963 (P.L. 88-206) as amended, has established National Ambient Air Quality Standards for six pollutants[5] to protect human health, as well as to protect against decreased visibility, damage to animals, crops, vegetation, and buildings. These standards apply to the two airsheds (Little Colorado River Airshed and Verde River Airshed) that overlap the Coconino NF. In addition, the EPA established in 1999 the Regional Haze Rule (40 CFR Part 51) for improved visibility in national parks and wilderness areas. These areas are known as Class I areas and are granted special protections against human-caused air pollution. One of the 12 Class I areas in Arizona overlaps a portion of the Coconino NF to the west (Sycamore Canyon Wilderness). Management activities on the forest are coordinated with the Arizona Department of Environmental Quality (ADEQ), as well as with adjacent agencies, to maintain and protect the air quality in the two airsheds and the Class I area.

Desired Conditions for Air Quality

FW-Air-Qual-DC

1 Air quality on the Coconino NF meets State and Federal air quality standards including visibility and public health. Air quality related values of high quality visual conditions and healthy breathable air are maintained within the Class I area.

[5] Carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide.

Guidelines for Air Quality

FW-Air-Qual-G

1 Project design for prescribed burns and strategies for wildfires should incorporate emission reduction techniques, such as those listed in Arizona Revised Statute (ARS) 18-2-15, to reduce negative impacts to air quality, subject to economic constraints, technical feasibility, safety criteria, and land management objectives.

2 Decision documents for wildfires and prescribed burns should identify smoke sensitive areas and include management objectives and courses of action to mitigate impacts to those areas.

Management Approaches for Air Quality

Coordinate with ADEQ during prescribed burns to comply with State and Federal regulatory requirements for emissions and impacts to Class I areas.

Coordinate with ADEQ during wildfires to ensure ADEQ is aware of potential smoke impacts to receptors.

To promote public awareness and protection of human health and safety, notify stakeholders and the public about potential smoke from fire activities through methods of advanced notification through the media and smoke warning signs along roads when visibility may be reduced due to wildland fire.

Related Plan Content for Air Quality

See the following: Fire Management; Scenic Resources; Sycamore Canyon Wilderness

Soil

General Description and Background for Soils

Soil is the outer, mostly unconsolidated, layer of the Earth's crust that is composed of a mixture of organic, mineral, air, and water in which plants grow. The ability of the soil to function within ecosystem boundaries is important to sustain biological productivity, maintain environmental quality, and promote plant and animal health. Soils are variable on the forest and range from hot, dry desert soils at the lowest elevations to cold, moist soils found in the alpine tundra at the highest elevations. Soils are inventoried and classified in the terrestrial ecological unit inventory called the "Terrestrial Ecosystem Survey[6] of the Coconino NF" (TES) (Miller et al., 1995).

Desired Conditions for Soil

FW-Soil-DC

1 Soils function properly to distribute water and cycle nutrients to a variety of vegetation including lichens, mosses, grasses, forbs, shrubs, and trees.

2 Soil productivity and functions, including the ability of the soil to resist erosion, infiltrate water and recycle nutrients, are sustained and functioning properly, so terrestrial and riparian

[6] The TES contains information for use in land planning and management programs on the Coconino NF. It contains predictions and limitations of soil and vegetation behavior for selected land uses. It also highlights hazards or capabilities inherent in the soil and the impact of selected uses on the environment.

ecosystems are more resilient and better adapted to climate change. Herbaceous vegetation cover is maintained at levels that contribute to suitable hydrologic function, soil stability, and nutrient cycling. The diversity of grass and forb species and presence of plant litter and grass, forb, shrub, and tree basal area surface cover reduce occurrences of compaction and erosion.

3 Soils are protected by adequate vegetative ground cover on the soil surface to prevent erosion from exceeding natural rates of soil formation (soil tolerance).

4 Biological soil crusts are present with limited soil disturbance (<1/3 of area impacted) and functioning on coarse textured and sandy soils.

Objectives for Soil

FW-Soil-Obj

1 Maintain satisfactory soil conditions and improve impaired and unsatisfactory soil conditions on 100,000 to 350,000 acres during the 10 years following plan approval[7].

Guidelines for Soil

FW-Soil-G

1 The forest should implement and monitor best management practices (BMPs) for all ground disturbance activities in accordance with the intergovernmental agreement between ADEQ and the Forest Service Southwestern Regional Office to control and manage nonpoint source pollution.

2 To preserve biological soil crusts, disturbance should be minimized in areas where the percentage of biological soil crusts exceeds 5 percent.

Management Approaches for Soil

Implement projects that are beneficial for maintaining and improving soil condition and productivity and water quality and quantity. Consider giving priority to activities with the least ground disturbance.

Use published terrestrial ecosystem survey information: (1) for broad resource and forestwide assessments and land management and project planning at regional, forest, and district levels; (2) as the basis for determining project goals and objectives, desired ecological conditions, and for predicting effects and impacts of the different management prescriptions and activities upon each terrestrial ecosystem; and (3) for the initial selection of areas for proposed projects.

Conduct onsite soil investigations and refine mapping for soil disturbing projects that require site-specific, precise, highly detailed soil information, which is beyond the scale of the terrestrial ecosystem survey. Analyze or collect site-specific terrestrial ecosystem survey information as needed to accurately determine limitations, suitabilities, and productivity potentials of the different terrestrial ecosystems that occur.

Work with the Rocky Mountain Research Station and other research organizations to understand the linkages among the physical and biological components of soil and plant populations that can

[7] Treatment priorities should move forest priority 6th code watersheds toward satisfactory conditions.

inform managers on responses of ecological and hydrological structure and function to management and disturbance.

Related Plan Content for Soil

See the following: Water Quality and Quantity; Vegetation; Fire Management; Roads and Facilities

Watersheds

General Description and Background for Watersheds

Plan direction for watersheds is described using watershed scales to help provide their relative importance or niche. Conditions for larger land areas are described under the 4th to 5th code watershed scale. More detailed descriptions for site-specific conditions are described at the 6th code watershed scale.

Municipal watersheds are those designated where communities obtain municipal water supplies by special use authorization. The only designated municipal watershed is the Inner Basin. Woody Well Field and Lake Mary Well Field are located in municipal supply watersheds.

Desired Conditions for Watersheds

FW-WtrShd-DC

1 Watersheds are functioning and are resilient to natural and human disturbances.

2 Watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential natural condition. All watersheds function properly, and the natural hydrologic, hydraulic, geomorphic, and biologic processes function at a level that allows retention of their unique physical and biological properties. Watersheds have enough effective vegetative groundcover, such that they are resilient, recover rapidly from natural and human disturbances, and maintain long term soil productivity. They exhibit a high degree of connectivity along the stream, laterally across the flood plain and valley bottom and vertically between surface and subsurface flows.

3 Watersheds provide important ecosystem services such as clean water, recharge streams and aquifers, maintain riparian communities, and moderate climate variability and change. They maintain long term soil productivity. Watersheds provide habitat that supports adaptive animal and plant communities that reflect natural processes.

Objectives for Watersheds

FW-WtrShd-Obj

1 Class 2 (functioning at risk) and Class 3 (impaired) 6th code watersheds are trending toward Class 1 in 5 to 7 priority 6th code watersheds[8] during the 10 years following plan approval.

[8] Priority watersheds are identified based on ecological, economic, social considerations, partnership opportunities, and potential benefits following the National Watershed Condition Framework or more current methodologies.

Guidelines for Watersheds

FW-WtrShd-G

1 To enhance the protection of human health and safety, watershed treatments such as vegetation thinning, prescribed burning, and channelization should be considered where protection of people, structures, and community infrastructure (e.g., roads, bridges, and power corridors) in and associated with the wildland-urban interface (WUI) are at risk.

2 Watershed restoration and maintenance should focus on priority 6th code watersheds to ensure that ecosystem processes, resilient vegetation conditions, and natural disturbance regimes are improved to, or remain in, proper functioning condition in those watersheds.

Management Approaches for Watersheds

Coordinate with the Rocky Mountain Research Station and other research organizations on long term and landscape studies of watershed function.

Related Plan Content for Watersheds

See the following: Soil, Aquatic Systems; Vegetation; Wildlife, Fish, and Plants; Fire Management; Roads and Facilities

Water Quality, Water Quantity, and Aquatic Systems

General Description and Background for Water Quality, Water Quantity, and Aquatic Systems

Aquatic systems depend on water quality and water quantity to function properly. Water quality also supports the designated beneficial uses (e.g., aquatic and wildlife, full or partial body contact, fish consumption, domestic water source, agriculture irrigation, and agriculture livestock watering). The aquatic systems contained in the plan include stream ecosystems, wetlands and reservoirs/lakes, springs, and constructed waters (e.g., earthen stock tanks and artificial drinkers).

Desired conditions for some aquatic systems are described using watershed scales to help provide their relative importance or niche. Conditions for larger land areas are described under the 4th to 5th code watershed scale. More detailed descriptions for site-specific conditions are described at the 6th code watershed scale. Not all aquatic systems require a description at each scale.

Four percent of the plants known to be used by tribes that traditionally use the forest occur in water.

Municipal watersheds are those designated where communities obtain municipal water supplies by special use authorization. The only designated municipal watershed is the Inner Basin. Woody Well Field and Lake Mary Well Field are located in municipal supply watersheds.

Water Quality and Water Quantity

Desired Conditions for Water Quality and Water Quantity

FW-Aq-Wat-DC

1 Adequate quantity and timing of water flows are maintained to retain or enhance ecological functions, including aquatic species and riparian vegetation consistent with existing water rights and claims.

2 Water quantity (base flows) of intermittent and perennial streams are seasonally sustained while peak flows and flood potential occur within the historic range of variability for that stream system.

3 New and existing instream water rights are maintained or procured to ensure that enough water is guaranteed to provide for habitat needs, as well as other needs on the forest, over the long term.

4 Water tables are high or elevated so minimal channel downcutting occurs.

5 Water quality is sustained at a level that retains the biological, physical, and chemical integrity of the aquatic systems and benefits survival, growth, reproduction, and migration of native aquatic and riparian species.

6 Water quality meets or exceeds Arizona water quality standards and supports identified designated beneficial uses and native aquatic species.

7 Watersheds that contain recharge areas for designated and eligible wild and scenic river segments retain water quality and recharge to those segments.

Guidelines for Water Quality and Water Quantity

FW-Aq-Wat-G

Water Quality

1 For impaired waters, approved total maximum daily load (TMDL) recommendations or implementation plans should be considered and implemented as appropriate[9] to maintain or improve water quality to meet or exceed Arizona water quality standards and support identified designated beneficial uses.

2 At least 80 percent of total streambank linear distance should be maintained in a stable condition to reduce sedimentation, maintain functioning of the channel with its flood plain, and maintain water quality and riparian habitat and function.

3 Best management practices for ground disturbing activities in and outside of streamside management zones should be identified, implemented, and monitored to maintain water quality, quantity, and timing of flows. Ground-disturbing activities should be mitigated through identification and implementation of BMPs from Forest Service Handbook (FSH) 2509.22 (Soil and Water Conservation Practices Handbook) and Draft FSH 2509.25 when finalized, or more current guidance.

[9] As determined by a forest interdisciplinary team.

Water Quantity

4 Instream flow water rights for fish, other wildlife, and recreation beneficial uses should be procured for those streams without current water rights to ensure that the water remains on site and is not diverted for other consumptive uses, so it benefits aquatic species, habitat, and recreation.

5 Use of water quantity appropriated within existing water rights should be utilized to let excess water flow freely back into existing channel, spring, and riparian habitat to maintain and improve water quality, quantity, and timing of flows for aquatic species and associated habitat.

Management Approaches for Water Quality and Water Quantity

File for water rights on appropriable waters following State procedures. Complete all documentation required for the adjudication process in the Little Colorado and Gila River (Verde watershed) specified by the courts.

Participate in State water rights adjudications and settlement discussions for negotiating water rights settlements outside of extended adjudication.

Secure water rights through purchase or severance and transfer when additional sources are needed.

Maintain and annually update an inventory of all water used on the forest in the forest water rights database.

Develop implementation plans as required by Arizona Revised Statute 49-234 for existing TMDLs to provide strategies to reduce existing pollutant loads identified in TMDLs and to be in compliance with applicable water quality standards for impaired waters.

Coordinate with county and State governments and stakeholders to protect public health and safety with respect to water quality, specifically, the threat of fertilizers to downstream resources on the forest.

Coordinate with stakeholders on water rights issues that can be utilized to maintain or improve riparian attributes.

Related Plan Content for Water Quality and Water Quantity

See the following: Stream Ecosystems; Wetland/Cienega and Reservoirs/Lakes; Springs; Riparian Types; Wild and Scenic Rivers; Monitoring Plan

Stream Ecosystems

General Description and Background for Stream Ecosystems

Stream ecosystems have flowing water and include rivers, creeks, and streams and their associated riparian vegetation zones. There are microhabitats such as riffles, pools, and backwaters. Plants, animals, and micro-organisms are specialized to live in and around flowing water. Stream ecosystems collect and transport water, sediment, and organic material from upslope, upstream, and moderate flood events.

A riparian vegetation zone is the interface between the terrestrial uplands and water, and it includes water dependent plants near the water and often a combination of upland and riparian species as distance from water increases. Riparian areas are more productive per acre in biomass of plants and animals than other vegetation communities, and they border many other vegetation communities, which adds significantly to their ecosystem diversity.

Healthy riparian areas slow water which raises the water table and saturation zone and recharges aquifers. Riparian zones protect streams from excessive sedimentation, erosion, and pollution, and, thus, play a role in water quality. They provide shelter and food for aquatic animals and shade that is important for water temperature regulation. They dissipate stream energy which can reduce flood damage. They provide wildlife habitat, increased biodiversity, and wildlife corridors, enabling aquatic and riparian organisms to move along river systems and thus avoiding isolated communities. Soils within riparian zones play a key role in nutrient and water storage and distribution.

Natural disturbances in stream ecosystems include animals such as beavers, flooding, and changing climatic conditions, such as extended drought. The seasonality and quantity of water in floods are key factors in the germination and establishment of riparian vegetation. Fire is an infrequent disturbance and is dependent on the fire regime in adjacent vegetation communities.

Stream ecosystems provide water, forage, shelter, and habitat for nesting, roosting, and bedding and are among the most important habitats for wildlife on the Coconino NF. Species that require water for part of their life cycle (i.e., aquatic and semiaquatic species) on the forest are entirely dependent on these limited and scattered water sources. Ninety-three percent (14 out of 15) of the native fish species on the forest are considered special status species. All three native leopard frogs on the forest are either federally listed or Forest Service sensitive species. Riparian areas make up less than 1 percent of the forest, yet are one of the most biologically diverse ecosystems. Two of the four most imperiled species in the Southwestern Region, Little Colorado spinedace and spikedace, occur in stream ecosystems on the forest. Additional special status species are supported by stream ecosystems such as the southwestern willow flycatcher and northern Mexican and narrow-headed garter snakes. Riparian areas provide migration corridors important for birds and bats.

On the Coconino NF, there are three types of watercourses: ephemeral, intermittent, and perennial. They differ in the timing and duration of waterflow and corresponding vegetation. Ephemeral watercourses flow short term in response to storm events. Intermittent watercourses flow seasonally usually in response to snowmelt and may contain perennial pools. Perennial stream courses flow year-round, and some of their flows may be below the surface. Watercourses include their associated drainages and flood plains.

The main forest riparian potential natural vegetation types (PNVTs) associated with intermittent and perennial systems on the Coconino NF are: (1) Cottonwood Willow Riparian Forest (Cottonwood Willow), (2) Mixed Broadleaf Deciduous Riparian Forest (Mixed Broadleaf), (3) Montane Willow Riparian Forest (Montane Willow) and (4) Gallery Coniferous Riparian Forest (Gallery Coniferous). These are described in the “Vegetation” section of this plan. The vegetation in ephemeral drainages is not as diverse as perennial systems but supports different vegetative species than in the adjacent uplands.

Desired Conditions for Stream Ecosystems

FW-Aq-Strm-DC

1 Stream ecosystems, riparian corridors, and associated stream courses are functioning properly and resilient to natural disturbances (e.g., flooding) and climate change; promote the natural movement of water, sediment, and woody debris; and provide habitat for native and desirable nonnative riparian and aquatic species.

2 Streams maintain their natural sinuosity, and their associated flood plains are intact. Channel depths allow for flood plains to be wetted during flood events. Watercourses and the riparian zone have access to their flood plains so that when floods do occur, energy can be dissipated without causing damage to the streambanks of the channel.

3 Watercourses, associated flood plains, and riparian zones are capable of filtering sediment, capturing and/or transporting bedload, aiding flood plain development, improving floodwater retention, improving or maintaining water quality, and providing groundwater recharge within their natural potential.

4 Stream ecosystems, including ephemeral watercourses, are not fragmented by infrastructure or development, consistent with existing water rights and claims. Ephemeral watercourses are important for dispersal, access to new habitats, perpetuation of genetic diversity as well as nesting and foraging for special status species.

5 Flooding is the primary disturbance. Streams and rivers maintain a natural hydrograph, or waterflow over time, including periodic flooding, which promotes natural movement of water, sediment, nutrients, and woody debris. Flooding creates a mix of stream substrates for fish habitat, including clean gravels for fish spawning and sites for germination and establishment of riparian vegetation.

6 Native fish and other native aquatic species are present, and habitat conditions are capable of supporting self-sustaining populations. Fish habitat is provided by overhanging banks where possible. Woody and herbaceous overstory and understory regulate stream temperatures and maintain soil moisture in the streamside management zone.

7 Links between aquatic and upland components are maintained, providing access to food, water, cover, nesting areas, and protected pathways for aquatic and upland species. Native fish and other aquatic organisms have unobstructed passage upstream and downstream at all bridge, culverts, and diversion structures, unless there is a specific need to provide a passage barrier such as to physically separate native and nonnative fish.

Related Plan Content for Stream Ecosystems

See the following: Water Quality and Quantity; Springs; Riparian Types

Wetland/Cienega and Reservoirs/Lakes

General Description and Background for Wetland/Cienega and Reservoirs/Lakes

Wetland/cienega ecosystems encompass discrete bodies of water such as wetlands, cienegas, lakes, and reservoirs and their associated vegetation composition and structure. This classification includes wetlands such as Mormon Lake and Stoneman Lake or reservoir/lakes such as C.C. Cragin Reservoir, Knoll Lake, Upper Lake Mary, and Lower Lake Mary.

On the Coconino NF, the term wetland means those areas that are inundated by water with a frequency sufficient to support—and under normal circumstances does or would support—a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions (i.e., presence of hydric soil) for growth and reproduction. Wetlands on the forest are generally disconnected from groundwater and perched above regional groundwater tables and, thus, are completely reliant on precipitation for water input. Therefore, standing water and vegetation in wetlands can fluctuate wildly from basically nonexistent in dry periods to highly productive wetlands in wet periods. Other key processes include the development and presence of hydric soils, decomposition, and nutrient cycling, as well as the geomorphic setting. The combination of these processes result in unique vegetation components and in a functioning wetland.

Natural disturbances are drought and flooding. Disturbances controlled by management activities are livestock grazing, stock tank construction, roads, and off-road vehicle use and other recreation use. Indirect disturbances include increasing tree cover that reduces ground cover in the upland soils and results in erosion and sedimentation of wetlands. Natural fire is an infrequent disturbance, entering from adjacent vegetation communities during drought conditions.

Wetland types differ in water permanency, wetland vegetation, and size. The wetland types are semipermanent, seasonal, temporary or ephemeral wetlands, and reservoirs (table 1).

Table 1. Flooding conditions by wetland type

Wetland Type	Flooding Regime[1]	Plant Species Occupying Deepest Zone	Flooding Frequency
Reservoir/lakes, open water	Permanent water	Submergent vegetation; bare soil	Every year
Semipermanent	6–12 months	Hardstem bulrush, cattail; submerged aquatics	>7 of 10 years
Seasonal	3–6 months	Manna grass, spikerush, sedges.	<7 of 10 years
Temporary	1–2 months	Alpine timothy, Foxtail barley	3 of 10 years
Ephemeral	2–6 weeks	Bare soil, dock, western wheatgrass, deergrass	< 3 of 10 years

[1] Flooding regime relates to the timing, spatial extent, depth, and response to runoff associated with the overflowing of water from the normal confines of a stream or other body or water.

Wetlands provide water storage, wildlife habitat, recreation, fisheries, and livestock watering. On the Coconino NF, wetlands primarily occur at elevations ranging from 6,200 to 7,200 feet and cover about 10,000 acres. Most are on Anderson Mesa, which is on the east-central side of the forest. They range in size from Mormon Lake at about 5,500 acres to smaller wetlands less than 10 acres in size.

Cienegas are linear streams associated with spring recharge that are primarily herbaceous and do not have woody vegetation. The forest contains 20 acres of cienegas. An example is Buck Springs on the Mogollon Rim Ranger District. Most cienegas now have stock tanks or dams associated with them that were constructed many years ago. Vegetation composition and structure and soil condition have been altered by stock tanks and dams because water persistence and depth has

changed, negatively affecting riparian function. Most cienegas do not have proper functioning condition (PFC) data, but those assessed were moderately departed.

Desired Conditions for Wetland/Cienega and Reservoirs/Lakes

FW-Aq-Wtlnds-DC

1 Wetlands and reservoirs/lakes provide functional soil and water resources to support diverse vegetation for native and desirable nonnative, riparian, and aquatic species habitat.

2 Within the capability of individual wetland types and consistent with the hydrologic cycle, wetland vegetation has diverse age classes, a diverse composition of native species, and includes species that indicate maintenance of riparian soil moisture characteristics (i.e., plants that occupy deep zones in table 1 above). This provides abundant food, cover, nesting, and spawning habitat.

3 Wetlands that are in proper functioning condition are maintained in proper functioning condition. All wetlands except reservoirs are maintaining or trending toward proper functioning condition, at a minimum.

4 Soil condition and riparian function are in satisfactory condition on most acres. Soil function (i.e., ability to infiltrate water, recycle nutrients, and resist erosion) is sustained.

5 Wetland types provide habitats that are consistent with their flood regime and flood potential.

6 Wetlands and reservoirs are managed consistent with designated beneficial uses associated with existing claimed or certified water rights. Water quality is maintained or improved so it fully supports identified beneficial designated special uses by ADEQ or State water quality standards.

7 Plants known to be used by tribes that traditionally use the forest are thriving.

Objectives for Wetland/Cienega and Reservoirs/Lakes

FW-Aq-Wtlnds-O

1 Restore 5 to 10 wetlands currently not in proper functioning condition (PFC) so that they are in, or are trending toward, proper functioning condition during the 10 years following plan approval.

Guidelines for Wetland/Cienega and Reservoirs/Lakes

FW-Aq-Wtlnds-G

1 Where necessary to restore waterfowl nesting habitat, fire may be used to remove vegetation and maintain wetland conditions that provide open water, cover, and other beneficial habitat features.

Related Plan Content for Wetland/Cienega and Reservoirs/Lakes

See the following: Water Quality and Quantity; Stream Ecosystems; Springs; Riparian Types

Springs

General Description and Background for Springs

There are multiple types of springs within the Coconino NF that vary based on landform and geology. Examples include seeps and hanging gardens. Some springs have a unique chemistry that depends on the underlying geology such as the springs that feed Fossil Creek—producing the unique turquoise color and resulting in travertine formations.

Many springs are used as water sources for domestic use, livestock, or wildlife. Springs and wetlands are centers of biological diversity. Springs provide habitat or biological refugia for some species, particularly narrow endemics.

Springs are also important to tribes who have traditionally used lands within the Coconino NF.

Desired Conditions for Springs

FW-Aq-Spr-DC

1 Springs provide sufficient water to maintain healthy habitats for native and desirable nonnative riparian and aquatic species and meet the demands of legally held water rights and uses.

2 Springs and associated streams and wetlands have the necessary soil, water, and vegetation attributes to be healthy and functioning at or near potential. Waterflow patterns, recharge rates, and geochemistry are similar to historic levels and persist over time.

3 Water quality and quantity maintain native aquatic and riparian habitat and water for wildlife and designated beneficial uses, consistent with water rights and site capability.

4 Water rights are maintained or procured to protect in situ (onsite) water quantity necessary for riparian vegetation needs; fish and wildlife; and domestic, agricultural, and livestock use.

5 Native vegetation around springs exhibits diverse age classes and composition of native species and includes species that indicate maintenance of riparian soil moisture characteristics (e.g., sedges, rushes, willows, and other riparian vegetation), consistent with the type of spring. Vegetation association with springs is variable depending on spring type and can include aquatic plants (e.g., diatoms and algae), submergent and floating vegetation, emergent vegetation, grasses, forbs, sedges, shrubs, and deciduous trees.

6 Plant cover protects the banks, edges, and shorelines of springs. Plant distribution (i.e., where it occurs on the landscape) and occurrence are resilient to natural disturbances.

7 Soil condition is in satisfactory condition on most acres with only minor components in unsatisfactory or impaired conditions. Soil function is sustained.

8 Spring riparian zones are capable of filtering sediment, capturing and/or transporting bedload, improving or maintaining water quality, and providing groundwater recharge within their natural potential.

9 Springs are resilient to natural disturbances and changing climate conditions and are functioning across the landscape within their type and capability. They are in proper functioning condition.

10 Stream and spring ecosystems are not fragmented by infrastructure or development, consistent with existing water rights and claims. Springs are rarely developed and altered by

human-made structures such as head boxes, cisterns, and pipelines, consistent with existing water rights and claims.

11 The physical and biological components of springs provide habitat for a diverse community of riparian and aquatic species including cover, forage, available water, microclimate, and nesting/breeding habitat.

Objectives for Springs

FW-Aq-Spr-Obj

1 Reconstruct[10] or restore riparian function to at least 25 springs identified as not in proper functioning condition to provide water quantity and aquatic habitat for the recovery of plant and animal species during the 10 years following plan approval.

Guidelines for Springs

FW-Aq-Spr-G

1 Fences constructed around springs should not cause harm to wildlife.

2 Structures that divert or alter spring flows should be avoided and/or modified to allow some flow from the spring's source to maintain habitat around the spring while still providing for established water rights.

3 Open vegetative conditions in the watersheds surrounding springs should be maintained to raise the water table.

Management Approaches for Springs

Continue working with partners and stakeholders, including tribes, to inventory, classify, and prioritize springs for restoration. Include consideration of rare and endemic species when evaluating springs for restoration.

Work with partners and stakeholders to develop strategies for restoration of upland watersheds to improve spring flows.

Secure water rights for springs where there are no existing water rights or claims.

Related Plan Content for Springs

See the following: Water Quality and Quantity; Stream Ecosystems; Riparian Types

Biophysical Features

Caves, Cliffs, and Talus Slopes

General Description and Background for Caves, Cliffs, and Talus Slopes

Biophysical features include geological features such as caves, cliffs, and talus slopes. Caves include any naturally occurring void, cavity, recess, or system of interconnected passages beneath the surface of the Earth or within a cliff or ledge, and that is large enough to permit a person to

[10] Where there is a structure in place to utilize water from a spring as a water source. In this case, water should be piped out of the riparian area to avoid trampling of the riparian area around the spring.

enter, whether the entrance is excavated or naturally formed. This definition includes any fissure (large crack), lava tube, natural pit, sinkhole, or other opening which is an extension of a cave entrance or which is an integral part of the cave. Cliffs are any high, steep, or overhanging rock or Earth face. Talus slopes are the accumulation of rock piled up at the base of a cliff, chute, or slope.

Cave resources include any material or substance occurring naturally in caves such as plant and animal life, paleontological deposits, sediments, minerals, cave formations, and cave relief features. Most cave resources are not replaceable and not renewable.

The Coconino NF contains many significant karst/limestone and volcanic/lava tube cave resources including Lava River Cave, a designated recreational cave. Caves often contain archaeological materials and are of traditional importance to various American Indian groups. Caves identified as the abodes of deities or forces of nature where ceremonial offerings are still made are traditional cultural properties. Caves provide habitat for a variety of wildlife, including bats. Temperature, humidity, and disturbance levels affect the ability of bats to roost in caves. Karst and other subterranean hydrological systems are important to the sustainability of the cave ecosystem, related interdependent fauna, and overall beneficial uses of the groundwater and surface water system. Recreational activities dependent on biophysical features (e.g., rock climbing) occur on the forest. Several rock climbing areas on the forest are nationally and internationally known.

Desired Conditions for Caves, Cliffs, and Talus Slopes

FW-BioPhys-Geo-DC

1 Caves, cliffs, and talus slopes have geological features that provide unique habitats for plants and wildlife, including some rare species, and are protected from damage or alteration that may result from recreational uses such as cave exploring and rock climbing.

2 Significant cave resources' aesthetic, cultural, and scientific values remain intact and are protected from damage. Caves provide a range of recreational and educational opportunities, without diminishing the cave resource.

3 Caves provide habitat for species that require specialized conditions for roosting and overwintering such as bats. Caves maintain moisture and temperature levels consistent with historic conditions. Caves known to be important for species of conservation concern are intact or provide habitat for these species. New bat diseases, such as white-nose syndrome, are not introduced in caves.

4 Archaeological, geological, paleontological, and biological features of caves are not disturbed by visitors.

5 Cave formations and relief features continue to develop or erode under natural conditions. Water flowing into, from, or within the cave system is not altered or diverted in its flow; contains normally fluctuating background levels of sediment, organic matter, and dissolved minerals; and is not polluted.

6 Cliffs and rock outcrops continue to support nesting and feeding habitats for birds of prey and roosting habitat for bats, and they provide escape, bedding, and lambing cover for Rocky Mountain bighorn sheep. They provide habitat for rare plants such as cliff fleabane, Senator Mine alumroot, and Flagstaff pennyroyal.

7 Rock climbing and related recreational activities offer challenges and opportunities for rock climbing, canyoneering, and other related recreational activities, but they do not diminish the quantity or quality of specialized vegetation, such as lichens, and wildlife communities nor do these activities disrupt life processes of rare or threatened species.

8 Dispersed recreation activities do not alter plant and wildlife communities or their substrate on cliffs and in caves. Graffiti and vandalism also do not occur within or on these sensitive habitat areas.

9 Talus slopes are natural, generally undisturbed features that provide habitat for lizards, snakes, land snails, lichens, and rare plants, including the San Francisco Peaks ragwort. They maintain near historic levels of moisture and are free from excessive sedimentation. In areas where there are species of conservation concern, there is a near historic level of high quality rocky habitat.

Standards for Caves, Cliffs, and Talus Slopes

FW-BioPhys-Geo-S

1 For caves that have been designated or nominated as "significant," manage to perpetuate those features, characteristics, values, or opportunities for which they were designated.

Guidelines for Caves, Cliffs, and Talus Slopes

FW-BioPhys-Geo-G

1 To prevent siltation into sinkholes, cave entrances, collapse of cave passageways, and alteration of the chemical, physical, and biological conditions of the cave resource, project design should include protections for cave entrances and subsurface geology, where they occur. A radius of 200 feet should be used for restrictions on activities[11] that can alter the cave's resources, functions and associated features unless site-specific adjustments are made based on topography, drainage, soil type, and the expected impact of the proposed activity.

2 Blasting and/or controlled source seismic surveys requiring explosives or other disruptive techniques should minimize damage to cave features.

3 To increase chances of survival for young wildlife, active roosts, nests, and dens should not be disturbed.

4 Human alteration of caves should be mitigated to mimic pre-disturbance conditions and function or where this level of restoration is not feasible to prevent further degradation of the cave resource and functions.

5 If previously undiscovered caves are encountered above the zone of saturation for the regional water aquifer during drilling operations, precautions should be taken to protect the cave, including sealing the casing above and below the cave to prevent airflow and water leakage to maintain sensitive ecosystem conditions.

6 Closure areas around caves or gating of caves should only be considered as a management practice when there are no other options to protect cave and wildlife resources and public

[11] This radius is not intended to exclude all management activities within the restricted area; only activities such as direct fire ignition, road construction, and mechanical treatment of vegetation which are expected to alter cave conditions are intended to be restricted or mitigated.

safety. When closing caves to public entry, wildlife friendly gates that meet Bat Conservation International (BCI) recommendations should be installed to protect bats and/or other wildlife species that are present.

Management Approaches for Caves, Cliffs, and Talus Slopes

Foster collaboration and exchange of information between governmental agencies, partners, and other stakeholders to address conservation and interpretation and education management for cave resources, grottos, and associated species.

Coordinate with partners and State and Federal agencies to both manage and monitor bat roosts to determine population dynamics at least once every 3 years.

Encourage partnerships with caving organizations, scientists, and outdoor recreationists to secure, preserve, and protect forest biophysical features and their resources.

Educate the public about the unique ecological and aesthetic value of biophysical features including cave protection, safety, and etiquette, particularly at Lava River Cave.

At the program level, monitor significant caves or other biophysical features to determine visitor impacts and the conditions of key resources in order to protect the long-term ecology of the feature or resource.

Periodically update the list of significant caves on the forest.

Foster collaboration with the U.S. Fish and Wildlife Service, Bat Conservation International, Arizona Game and Fish Department, and other stakeholders to address conservation and interpretation and education management for bat species.

Educate the public on disease prevention “best practices” for caves.

Related Plan Content for Caves, Cliffs, and Talus Slopes

See the following: Paleontological Resources; Alpine Tundra; Wildlife, Fish, and Plants; Heritage Resources; Dispersed Recreation

Paleontological Resources

General Description and Background for Paleontological Resources

Paleontological resources are any fossilized remains, traces, or imprints of organisms, preserved in or on the Earth’s crust that are of paleontological interest and provide information about the history of life on Earth.

Desired Conditions for Paleontological Resources

FW-BioPhys-Paleo-DC

1 The unique fossils that represent paleontological resources are available for scientific research and limited public collection with minimal human impacts to study and/or collection sites.

2 The scientific value of paleontological sites is preserved and sites are generally free from adverse impacts. Sites retain integrity and stability, especially sites susceptible to imminent risks or threats, or where the values are rare or unique. Visitor impacts to sites are minimal, and significance and integrity are maintained through conservation and preservation efforts. Vandalism, theft, and human-caused damage to paleontological resources are rare. Vertebrate fossils (commonly bones, bone fragments, teeth and/or tracks) remain on the forest, unless collected by permit. Casual collecting of reasonable amounts of common invertebrate and plant paleontological resources for noncommercial personal use result in negligible surface disturbance. Paleontological resources and copies of associated records are preserved for the public in an approved repository, to be made available for scientific research and public education.

Guidelines for Paleontological Resources

FW-BioPhys-Paleo-G

1 To conserve scientific, interpretive, and legacy values, known locations of key paleontological resources (Classes 3, 4, and 5 of the Probable Fossil Yield Classification system) should be protected from disturbance. If full protection is not feasible, effects of disturbance should be mitigated to the extent possible.

2 Areas including, but not limited to, wilderness, botanical, or geological special areas, and research natural areas may be closed to casual fossil collecting or require a permit for any fossil or paleontological resource collection to protect the resources for which those areas were designated. Locality information of paleontological resources should also be protected to preserve cultural integrity and value.

Management Approaches for Paleontological Resources

Emphasize interagency coordination and collaborative efforts, where possible, with the scientific community, non-Federal partners, and the general public.

Conduct paleontological surveys in areas where there is high potential to encounter these resources prior to ground-disturbing activities.

Facilitate evaluation of the discovery and development of appropriate mitigation measures if paleontological resources are discovered.

Develop a prioritized list of localities that need stabilization activities to preserve them. Monitoring of localities is prioritized in high visitation areas such as roads, campgrounds, and trails.

Retain records at Forest Services offices when they need to be accessed regularly for research purposes. Maintain electronic records, including an index of documents of historic research value.

Work with partners such as the Museum of Northern Arizona and Northern Arizona University to protect and monitor localities.

Promote educational programs, interpretive presentations, or publications to increase public awareness of forest paleontological resources and their significance.

Related Plan Content for Paleontological Resources

See the following: Caves, Cliffs, and Talus Slopes; Heritage Resources; Recreation

Vegetation

All Vegetation Types

See appendix A, map 4.

General Description and Background for All Vegetation Types

Scale

The ecological desired conditions for terrestrial ecosystems are grouped by potential natural vegetation types (PNVTs) and described at multiple, nested scales and may only be achievable over a long timeframe (e.g., several hundred years). Descriptions at various scales are developed to provide detail and guidance for the design of future projects and activities that help achieve the desired conditions over time. Descriptions under the landscape scale provide the "big picture" desired conditions for terrestrial resources across the larger land area. Descriptions at the mid-scale and fine scale provide further details necessary for guiding future site-specific projects and activities. A combination of fine scale units adds up to the mid-scale and a combination of mid-scale units adds up to the landscape scale. These scales are for descriptive purposes, and not all scales may necessarily apply to every project.

The landscape scale is an assemblage of mid-scale units, typically composed of variable elevations, slopes, aspects, soils, plant communities, and disturbance processes. An area at the landscape scale is comprised of multiple mid-scale units, most often 10 or more. For this plan, the mid-scale is a unit of 100 to 1,000 acres and is composed of assemblages of fine scale units that have similar biophysical conditions. The fine scale description is usually a 10-acre area or less at which finer scale items are described such as the distribution of individual trees (e.g., single, grouped, or aggregates of groups).

Desired Conditions for All Vegetation Types

FW-Veg-All-DC

Landscape Scale (10,000 acres or greater)

1 Each PNVT contains a mosaic of vegetation conditions, densities, and structures. This mosaic occurs at a variety of scales across landscapes and watersheds and reflects the natural disturbance regimes affecting the area.

2 Vegetation conditions are resilient to the frequency, extent, and severity of disturbances such as fire in fire-adapted systems, flooding in riparian systems, and climate variability. Coconino NF landscapes are functioning ecosystems that retain their components, processes, and functions. Natural and human disturbances provide desired overall plant density, species composition (i.e., mix of species), structure (i.e., form, shape, arrangement, and density of the species of the composition on the landscape), coarse woody debris, and nutrient cycling. Desired disturbance regimes, including fire, are restored where practical.

3 Native plant communities dominate the landscape while invasive species are nonexistent or in low abundance and do not occur at levels that disrupt ecological functioning.

Establishment of invasive plant species new to the Coconino NF is prevented. Existing invasive plant species are prioritized for eradication, containment, or control.

4 Vegetation and stream connectivity provides for upland and aquatic species movements and genetic exchange consistent with landforms and topography.

5 Vegetation conditions allow for transition zones or ecotones between riparian areas, forests, woodlands, shrublands, and grasslands. Transition zones shift in time and space due to factors affecting site conditions (e.g. fire, climate).

6 Native insect and disease populations are generally at endemic levels with occasional outbreaks. A variety of vegetation structures usually restrict the scale of localized insect and disease outbreaks.

7 Vegetation provides sustainable amounts of products, such as wood fiber or forage. Herbivory (the act of feeding on plants) aids in sustaining or improving native vegetation cover and composition. Livestock grazing and wood fiber harvest activities contribute to aspects of the social, economic, and cultural structure and stability of rural communities.

8 Ecosystem contributions (e.g., nutrient cycling, water infiltration, wildlife habitat) are sustained as vegetation on the forest adapts to a changing climate.

9 Plants known to be used by tribes that traditionally use the forest are thriving.

10 Rare and culturally important plant species are valued, and their habitats are enhanced and protected.

Mid-Scale (100 to 1,000 acres)

11 The composition, density, structure, and mosaic of vegetation conditions reduce the threat of uncharacteristic wildfires to local communities and ecosystems.

12 Potentially suitable habitat for Southwestern Region sensitive plant species helps maintain the viability of those species.

Fine Scale (10 acres or less)

13 Endemic rare plant communities are intact and functioning.

14 Unique plant community habitats (e.g. limestone cliffs, margins of springs, Verde Valley Geological Formation, basalt lava flows/cinders, calcareous soil/alkaline clay, canyons/cliffs and ledges, granitic soils/igneous rocks, and sandstone rocks/soils) are present to maintain self-sustaining populations of associated native plant species.

15 Habitat conditions promote pollinator success and survival.

16 Snags are present in adequate numbers to provide habitat features such as cavities and loose bark.

Objectives for All Vegetation Types

FW-Veg-All-O

1 Achieve 1,000 acres of aspen and maple restoration during the 10 years following plan approval.

Standards for All Vegetation Types

FW-Veg-All-S

1. Clearcutting may be used as a cutting method only where it is determined through site-specific analysis to be the optimum method for a particular area to make progress toward desired conditions. The maximum size opening that may be created using the clearcut method shall not exceed 40 acres except when it is following a large-scale disturbance event such as a stand-replacing fire, wind storm, or insect or disease outbreak.
2. Seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an even-aged stand of timber may be used as a cutting method only where it is determined to be appropriate to meet the desired conditions. These other even-aged methods may exceed 40 acres when, following interdisciplinary review, it is determined appropriate to meet land management objectives. This standard requires 60 days public notice and review by the regional forester.
3. When openings are created with the intent of regeneration, efforts shall be made to ensure that lands can be adequately restocked within 5 years of final harvest.

Guidelines for All Vegetation Types

FW-Veg-All-G

1. In order to reduce the risk of wildfires in wildland-urban interface areas, forest and woodland vegetation within the wildland-urban interface may have lower tree density, more open stand conditions, younger age classes, and less coarse woody debris and snags.
2. Even-aged silvicultural practices may be used as a strategy for achieving the desired conditions over the long-term such as bringing mistletoe infection levels to within a sustainable range or for old tree retention.
3. Naturally ignited fires (i.e., lightning-caused fires) should be allowed to burn in fire adaptive vegetation types when burning conditions facilitate progress toward desired conditions.

Management Approaches for All Vegetation Types

Foster partnerships with the Rocky Mountain Research Station and other science organizations to develop concepts and tools applicable to vegetation management on the Coconino NF, as well as identify research opportunities related to management activities aimed at restoring ecosystems.

Work with volunteer groups on projects that improve vegetation and ecosystem function.

Related Plan Content for All Vegetation Types

See the following: Aquatic Systems; Biophysical Features; Soil; Wildlife, Fish, and Plants; Invasive Species; Fire Management; Livestock Grazing; Forest Products; and Scenic Resources

Riparian Types

See appendix A, map 5.

General Description and Background for Riparian Types

Cottonwood Willow Riparian Forest

Cottonwood Willow Riparian Forest currently covers about 2,507 acres of the Coconino NF and is found between 2,500 and 4,300 feet in elevation. It is patchily distributed along the lower gradient reaches of perennial streams including the Verde River, Oak Creek, West Clear Creek, Wet Beaver Creek, Dry Beaver Creek, and Fossil Creek as well as other perennial and intermittent streams and tributaries. Dominant vegetation includes: Fremont cottonwood, willow, ash, box elder, alder and others. Various grasses and forbs are usually present. Riparian vegetation generally occurs along the stream channel.

Cottonwood Willow is adjacent to the main communities of Cottonwood, Camp Verde, and Cornville and other communities in the broader valley flood plains along the Verde and confluences of its major tributaries. Much of this PNVT along the Verde River, lower Oak Creek and lower Wet Beaver Creek is privately owned or managed by Arizona State Parks. Water diversions and increasing human development in the watersheds have affected quantity and seasonality of historical flood regimes.

Eighteen percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Mixed Broadleaf Deciduous Riparian Forest

Mixed Broadleaf Deciduous Riparian Forest covers approximately 3,612 acres of the Coconino NF. Found between 3,300 and 6,400 feet in elevation, it is patchily distributed across the forest and includes Sycamore Canyon; mid-elevation portions of West Clear Creek, Oak Creek, Beaver Creek and Fossil Creek; and associated tributaries. Mixed Broadleaf consists of a vegetation mix of riparian woodlands and shrublands with various dominant species, depending on site-specific characteristics. Vegetation can include: Arizona sycamore, thin leaf alder, willow, conifers, box elder, narrow leaf or Fremont cottonwoods, velvet ash, Arizona walnut, and often contains oaks and conifers, including Arizona cypress, from adjacent uplands. Soil productivity is inherently low on terraces and higher along flood plains.

Twenty-seven percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Montane Willow Riparian Forest

Montane Willow Riparian Forest covers approximately 3,829 acres of the Coconino NF. Found between 4,700 and 8,700 feet in elevation, it is scattered along perennial streams such as Upper Clear Creek and its tributaries; seasonally intermittent streams; wet meadows; and isolated springs at higher elevations. Trees include: Bebb’s willow, narrowleaf cottonwood, velvet ash, cherry, box elder, Arizona walnut, and Arizona alder. Dominant shrubs include red osier dogwood, willows, and woods rose. The understory consists of a variety of grass and grasslike species, including sedge, Baltic rush, spikerush, and deergrass. Outlying populations of this PNVT may have unique genetic components.

Eight percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Gallery Coniferous Riparian Forest

Gallery Coniferous Riparian Forest covers approximately 200 acres of the Coconino NF. Found between 6,100 and 6,800 feet in elevation, it is known as the "canyon bottom forest," and it is located in areas such as Jack's Canyon (north of State Highway 87) on the Mogollon Rim Ranger District and the upper end of the West Fork of Oak Creek. Historically this PNVT had over 10 percent tree and shrub cover, with the exception of early, post-disturbance communities. This PNVT experiences periodic flooding and high water tables. Dominant tree species typically include: subalpine fir, Engelmann spruce, Douglas-fir, blue spruce, quaking aspen, narrowleaf cottonwood, bigtooth maple; box elder, alder, willows, Gambel oak, ponderosa pine, and Rocky Mountain juniper. Dominant shrubs include red osier dogwood, willows, and woods rose. The understory consists of a variety of grass and grasslike species, including sedge, Baltic rush, spikerush, and deergrass.

Desired Conditions for Riparian Types

All Riparian Forest Types

FW-Veg-Rip-All-DC

1 Riparian PNVTs have healthy watersheds and riparian areas that are resilient to disturbances (e.g., flooding); allow a variety of plant and animal species to thrive, especially those unique to these habitats; and allow ecological processes to perform their natural role. Generally, riparian areas are rarely impacted negatively by livestock.

2 Riparian zones filter sediments and contaminants, build and stabilize banks, reduce the effects of flooding, store and release water, recharge the aquifer, support a diverse composition of riparian vegetation which regulates water temperature, and support a high diversity of native aquatic and water-dependent fauna. Native riparian vegetation is diverse and provides the structure and composition to function within their natural potential and provide food and cover for wildlife.

3 Riparian areas are properly functioning and are comprised of a diverse age class of riparian-wetland vegetation and composition that have root masses and herbaceous vegetation capable of stabilizing banks, and function to filter sediment and maintain or improve water quality to attain designated beneficial resource uses. Riparian vegetation includes native aquatic plants, aquatic macrophytes, aquatic emergents, grasses and sedges, forbs, shrubs, and deciduous trees. The diversity of riparian vegetation in all age classes provides for structural diversity important to fauna. Structural diversity includes aquatic vegetation; leaf litter; ground cover and understory, mid-story, overstory, dead and live trees; and dead and down woody material. This woody material provides prey base habitat, aquatic nutrient cycling, and soil retention. Multiple seral stages and age classes of native vegetation are represented. Enough seedlings and saplings are present for replacement and succession.

4 Mesquite bosques are open, parklike stands of mesquite trees which are adjacent to Cottonwood Willow or Mixed Broadleaf Deciduous Riparian vegetation. The water table is high enough so that mesquite bosques persist on upland terraces. The combination of Cottonwood Willow Riparian Forest with mesquite bosques creates a unique vegetation community favored by bird species such as the yellow-billed cuckoo and Bell's vireo.

5 In mesquite bosques, a variety of age classes are present and old trees are prominent. The understory is comprised of native grasses and forbs that support the natural fire regime. Based on terrestrial ecosystem survey map units, vegetation ground cover in mesquite

bosques is comprised of about 15 percent litter and 10 percent plant basal area. Non-vegetation ground cover consists of sandy soils and rock fragments of gravel, cobble, and rock outcrop.

6 Riparian areas also provide abiotic structure such as silt, sand, gravel, cobble, boulders, and bedrock—all of which are important for a variety of aquatic and terrestrial fauna. The associated water table supports riparian vegetation and restricts nonriparian vegetation. Riparian vegetation assists in filtering ash from flowing into perennial streams.

7 Soils are rarely compacted by management activities and are protected by leaf litter cover.

8 Soil function is sustained so it infiltrates and disperses water properly, withstands accelerated erosion, and cycles nutrients. Upland vegetation is maintained or improved to prevent excessive erosion of or sedimentation into downstream aquatic habitat.

9 Soil in wet and headwater meadows has a spongy, moist nature, generally as a result of a shallow water table and functions to filter water. These soils also store and release water over an extended period of time and release it so it is distributed downstream and through associated meadows.

10 Flooding is the primary disturbance, not fire. Fire is a disturbance from incursions originating in adjacent systems and may creep into riparian corridors. Fire in riparian areas is influenced by the fire regime condition class in adjacent vegetation types. Depending on temperature, precipitation, and drought, fire behavior and effects are variable. Fire in the surrounding watersheds periodically provides slight increases in sediment, nutrients, and water that cause minimal channel modifications.

11 Habitat and ecological conditions are capable of providing self-sustaining populations of native, riparian-dependent plant and animal species.

Cottonwood Willow Riparian Forest

FW-Veg-Rip-CWRF-DC

1 Associated higher stream terraces support a mix of riparian and upland vegetation, including mesquite and desert willow. Soil productivity is inherently low on terraces and high on flood plains due to available soil and water. Flood plains tend to have higher surface litter and diversity of species, more protective ground cover, and greater vegetation productivity (i.e., biomass) than terraces. Consequently, flood plains have greater ability to resist erosion and recycle nutrients. Bends in the stream channel and low gradient help disperse stream energy. Water tables remain high year round.

Mixed Broadleaf Deciduous Riparian Forest

FW- Veg-Rip-MBDRF-DC

1 Generally, both terraces and flood plains have high amounts of protective litter and plant cover and are not compacted. Consequently, terraces and flood plains are able to resist erosion and recycle nutrients. Water tables remain high year round.

Montane Willow Riparian Forest and Gallery Coniferous Riparian Forest

FW- Veg-Rip-MW&GCRF-DC

1 Soils have high amounts of litter and plant cover, and a spongy, moist surface in terraces and wet meadows. Soil productivity is moderate to high on terraces and higher along flood

plains. Generally, both have high amounts of protective litter and plant cover and are not compacted. Consequently, terraces and flood plains are able to resist erosion and recycle nutrients. Water tables in Montane Willow Riparian are at levels that sustain properly functioning riparian forests. Water tables in Gallery Coniferous Riparian are seasonally high.

Objectives for Riparian Types

All Riparian Forest Types

FW-Veg-Rip-All-O

1 Restore the structure of at least 200 to 500 acres of nonfunctioning and functioning-at-risk riparian areas during the 10 years following plan approval, with emphasis on priority 6th code watersheds, so that they are in or moving toward proper functioning condition.

Guidelines for Riparian Types

All Riparian Forest Types

FW-Veg-Rip-All-G

1 In riparian areas, recreation activities, permitted uses, and management activities should occur at levels or scales that do not significantly impact soil function, riparian vegetation, and water quality.

2 A vegetated streamside management zone[12] should be identified and maintained.

Table 2. General starting point for width of stream management zones in riparian and nonriparian stream courses by erosion hazard

Erosion Hazard	Width of Zone in Nonriparian Stream Courses	Width of Zone in Riparian Stream Courses
Severe	100 feet each side of stream course	120 feet each side of stream course
Moderate	70 feet each side of stream course	100 feet each side of stream course
Slight	35 feet each side of stream course	70 feet each side of stream course

3 When riparian areas are accessible, livestock use should be restricted to times when vegetation is dormant. To avoid negative impacts to vegetation, livestock utilization should not exceed 20 percent on woody vegetation (e.g., trees and shrubs such as cottonwood and willow). Within riparian areas, an adequate height of herbaceous, water-loving vegetation should be maintained to protect streambanks. This guideline would not apply to structural

[12] This zone generally follows the shape of the water course or riparian areas and consists of vegetation and vegetative litter. The purpose is to buffer against detrimental changes in the temperature regime of the water body, provide bank stability, filter excessive sediments such as ash flows and nutrients, and provide shade for fisheries habitat. The intent is to minimize, not necessarily exclude, soil and vegetation disturbance from management activities in this zone. The ability of the stream management zone to trap and filter sediments is a function of the amount and type of material on the ground and width and slope of the zone. Table 2 is intended to be a general starting point for determining the width of the streamside management zone, based on average cover conditions and erosion hazard. Other considerations for the size and shape of a streamside management zone include soil type or hydrologic soil group, orientation of stream or river to the sun, connection of stream to impaired waters, presence of threatened or endangered species, and condition of the riparian area.

developments such as gaps, pipelines, or other infrastructure used to minimize impacts to riparian areas at a larger scale.

4 To provide habitat for wildlife, particularly special status species such as the yellow-billed cuckoo, mesquite bosques should not be fragmented by development and infrastructure.

5 To assure vegetative diversity at the fine scale, management activities should promote the presence over the long term (i.e., within 10 years) of three or more riparian species, where site potential exists, in a variety of age classes including seedling, sapling, mature, and overmature.

6 In order to achieve bank stability and soil and riparian function, effective (80 percent of natural herbaceous levels) vegetative cover within flood plains, terraces, and riparian areas should be maintained. This guideline would not apply to structural developments such as gaps, pipelines, or other infrastructure used to minimize impacts to riparian areas at a larger scale.

Related Plan Content for Riparian Types

See the following: Aquatic Systems; Soil; Wildlife, Fish, and Plants; Invasive Species; Recreation

Desert Communities

See appendix A, map 6.

General Description and Background for Desert Communities

Desert Communities (also known as desert scrub) cover approximately 63,548 acres of the Coconino NF. Generally found between 2,700 and 4,800 feet in elevation, they are located on the Red Rock Ranger District. Desert Communities contain numerous roads and private land parcels and adjoin the communities of Cottonwood, Camp Verde, Cornville, and Page Springs. Desert Communities are comprised of two vegetation subtypes that vary in composition and structure: creosote bush-dominated sites and crucifixion thorn-dominated sites.

Some soils in this PNVT contain significant quantities of calcium carbonate, and a pH of 8 or more is common. There is severe erosion hazard on slopes greater than 35 percent. The hot arid climate and calcareous soils significantly limit potential for revegetation. This is not a fire-adapted community, but fire has historically occurred at infrequent intervals. This PNVT supports a unique community of endemic plants adapted to these calcium-rich soils, and it is the location of the Verde Valley Botanical Area.

Fifty-seven percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Desired Conditions for Desert Communities

FW-Veg-DC-DC

Landscape Scale (10,000 acres or greater)

1 Desert Communities have functional soils that support a variety of native species, including endemic plants such as Arizona cliffrose.

2 Predominant plants are native shrubs and grasses in various age classes. There is sparse vegetation cover over most of the area that includes native perennials and varying amounts of native annual species. Cover of these can be high after exceptionally wet winter or summer seasons, but the cover is of short duration and does not lead to uncharacteristic fire. There is successful regeneration and establishment of native endemic plant species.

3 Erosion occurs at natural rates. There is little sign of compaction or accelerated erosion. Arroyos are stabilizing and recovering. Soils are friable and biologically diverse so plants form beneficial relationships with soil microbes. Roots are covered with soil and there is little evidence of plants perched above the soil with exposed roots (i.e., pedestalling).

4 Fires are rare because this is not a fire-adapted community.

Mid-Scale (100 to 1,000 acres)

5 Habitat for Arizona cliffrose (a federally endangered species) and endemic plants is connected and preserved. Population numbers for Arizona cliffrose remain static or increase over the long term. Habitat for Arizona cliffrose and other endemic plants remains suitable.

Fine Scale (10 acres or less)

6 Biological soil crusts are present to improve nutrient cycling and stabilize soils, especially in sandier soils.

Guidelines for Desert Communities

FW-Veg-DC-G

1 Excessive ground disturbance[13] should be avoided to limit accelerated erosion and to minimize bringing more calcareous soil to the surface[14].

Related Plan Content for Desert Communities

See the following: Soil; Wildlife, Fish, and Plants

Grassland Types

See appendix A, maps 6 and 11.

General Description and Background for Grassland Types

Great Basin Grasslands and Montane Grasslands provide habitat for pronghorn, a management indicator species.

[13] According to the TES, excessive ground disturbance results in the extent of exposed soil greater than expected for the site; active erosion features with soil being carried offsite in most areas, not just in localized patches; live plants and litter not protecting most of the area; obvious flow patterns and fan deposits; abundant deep rills; and deep gullies with sharp edges.

[14] Bringing calcareous soil to the surface would limit soil plant nutrient availability.

Semidesert Grasslands

Semidesert Grasslands cover approximately 89,683 acres of the Coconino NF. They occur on the Red Rock Ranger District and are bounded by the PNVTs Desert Communities at lower elevations and Piñon-Juniper Evergreen Shrub at higher elevations. They contain numerous roads and private land parcels and adjoin the main communities including Camp Verde, Cottonwood, and Cornville. Soils in this PNVT are generally not suited for intensive disturbance because they are dominated by soils that are shallow, have high amounts of surface rock, high amounts of carbonates at or near the surface, or high amounts of clay with low bearing strength (i.e., the inability to support a load without soil movement). Agaves provide food for birds, javelina, invertebrates, other wildlife, and American Indians.

Thirty-five percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Great Basin and Montane/Subalpine Grasslands

Lying in a patchwork across the Colorado Plateau, these grasslands vary in size from just a few acres to well over 1,000 acres. A wide variety of species of grasses and forbs characterize their vegetation which varies according to soil type, soil moisture, and temperature. These grasslands provide vegetative diversity needed by wildlife and breathtaking views, and they are themselves a highly attractive visual resource. Prairie dogs are present in a variety of locations. Where they exist, they are a key component in their environment because their burrows provide shelter, and they are prey for a variety of birds and animals. Lack of fire as a natural disturbance in some soil types has encouraged the growth of trees and shrubs.

Great Basin Grasslands cover approximately 96,335 acres or approximately 5 percent of the Coconino NF. Found between 4,800 and 7,500 feet in elevation, they are more arid than Montane/Subalpine Grasslands. Typical locations are Anderson Mesa and near Wupatki National Monument. They consist mostly of grasses with smaller amounts of forbs and shrubs. Trees can be present in trace amounts depending on the soil; however, tree canopy is increasing in some areas, especially in the northeast part of the forest around Wupatki National Monument. Species include, but are not limited to, western wheatgrass, black grama, blue grama, galleta grass, hairy grama, spike muhly, and needle and thread grass. Trees may include sparse one-seed juniper, alligator juniper, red berry juniper, Utah juniper, and Colorado piñon pine. Natural disturbances are weather, fire, and natural soil movement (e.g., natural shrink–swell and seasonal surface cracking).

Twelve percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Montane Grasslands generally occur at elevations between 6,000 and 8,000 feet. Typical locations include Kendrick Park, Antelope Park, and Mule Park. They are more productive than Great Basin and Semidesert Grasslands. Species include, but are not limited to muttongrass, mountain muhly, spike muhly, Arizona fescue, blue grama, red three-awn, squirreltail, yarrow, and pine dropseed. Nonnative Kentucky bluegrass is present. Trees occur along the periphery of Montane Grasslands. Vegetation in some of the Montane Grasslands soil types are maintained by fire. They are also influenced by weather. Tree canopy is increasing in some areas. These grasslands are susceptible to channel and gully erosion and subsequent dropping of the seasonal, perched water table during runoff events.

Subalpine Grasslands occur at elevations ranging from 8,000 to 10,300 feet on deeper soils with warmer, drier aspects than adjacent Mixed Conifer vegetation types or Spruce-Fir. A typical location is on the San Francisco Peaks. These productive communities often harbor several plant associations with varying dominant grasses and herbaceous species. Such dominant species may include: pine dropseed, nodding brome, various sedges, Arizona fescue, mountain junegrass, mountain muhly, muttongrass, and squirreltail. Trees may occur in trace amounts within these grasslands and along their periphery. Shrubs may also be present. These meadows are seasonally wet and closely tied to snowmelt. They are often maintained by fire.

Desired Conditions for Grassland Types

All Grassland Types

FW-Veg-Grass-All-DC

1 Grasslands are open, grassy areas with limited trees and shrubs and contribute to functional and productive soils and watersheds, provide habitat for wildlife, and provide ground fuels conducive to low severity fires.

Semidesert Grasslands

FW-Veg-Grass-SDG-DC

Landscape Scale (10,000 acres or greater)

1 Semidesert Grasslands are open and connected grasslands punctuated by groves of trees and shrubs. Predominant species are perennial native grasses. The moderate to dense native herbaceous cover includes annual and perennial desert grasses and forbs, succulent species, shrubs, and some herbaceous cover of annuals. Cool and warm season species are present at varying heights. Tree and shrub cover is less than 10 percent. Tree and shrub species include turbinella oak, catclaw mimosa, crucifixion thorn, Utah juniper, redberry juniper, and one-seed juniper. All age classes are present.

2 Herbaceous vegetation cover is maintained at levels that contribute to suitable hydrologic function, soil stability, and nutrient cycling. A diversity of grass and forb species and presence of plant litter reduces the occurrence of compaction and erosion. Diversity of grass and forb species is at or nearing potential. Arroyos and gullies are stabilizing and recovering. Soils have adequate vegetative ground cover including herbaceous cover and leaf litter to maintain soil productivity and are permeable and capable of infiltrating water to reduce instances of overland flows during precipitation events. Improved water infiltration reduces arroyos and gullies and head cuts from forming in drainages.

3 Fire plays its natural role on the landscape. Native grasses or understory species carry fire and maintain the natural fire regime (greater than 75 percent overstory mortality or herbaceous top kill). Although the presence of annuals may be of short duration, they do not cause changes to the natural fire regime.

Mid-Scale (100 to 1,000 acres)

4 Multiple seral stages of native vegetation are present.

Table 3. Desired proportion of seral stages for Semidesert Grasslands

Successional Structure, Composition, and Cover Class	Reference Percent Composition
Grass forb regeneration	24%
Open perennial bunchgrass	76%
Perennial bunchgrass with shrubs and trees	0%
Shrubs and trees with perennial bunchgrass	0%

Fine Scale (10 acres or less)

5 In the Schoolhouse area on the Red Rock Ranger District, remnant populations of big sacaton grass are reproducing sustainably on suitable soils.

6 Biological soil crusts are present to improve nutrient cycling and stabilize soils, especially in sandier soils.

Great Basin and Montane/Subalpine Grasslands

FW-Veg-Grass-GB&MSG-DC

Landscape Scale (10,000 acres or greater)

1 The composition, structure, and distribution of native vegetation reflects a mix of early, middle, and late seral stages. Early seral stages will typically contain more forbs, and as stages get older, they are dominated by more grasses and fewer forbs. Vegetation height, density, and cover support the historic fire return interval, where fire played a role, while providing food and cover for wildlife species, including pronghorn. Historic fire is thought to be low-intensity fire with a 1- to 35-year fire return interval and is generally dependent on the fire regime in adjoining vegetation types.

2 Tree and shrub cover are each less than 10 percent. There are inclusions and variability within the landscape as well as ecotones on the fringes. There is regeneration, seed head production, and balance of grasses and forb species, including warm and cool season species in most years and within the capability of soils.

3 Vegetative ground cover and herbaceous vegetation provide protection from accelerated erosion and promote water infiltration and nutrient cycling function. Soil function is sustained. Soil has the ability to infiltrate water, resist erosion, and recycle nutrients to maintain long-term soil productivity. Soil surface structure is granular or well aggregated to promote water infiltration and reduce runoff. Grasslands are connected based on the distribution of Mollisol soils and not fragmented. Natural surface drainages and subsurface flow patterns are not altered by human-made or ungulate disturbance, and they are maintained to assure waterflow into connected waterbodies or streams.

4 Leafy spurge, an invasive noxious weed, is not present on the landscape. If it is present, it does not compete with rare plant species such as Arizona sneezeweed and Apache beardtongue.

Mid-Scale (100 to 1,000 acres)

5 Table 4 below shows desired ranges for grass and forb cover and plant basal area and litter cover by grassland types based on estimated production potential in TES.

Table 4. Desired cover ranges for Great Basin and Montane/Subalpine Grasslands

Grassland Type	Grass and Forb Cover[1]	Plant Basal Area and Herbaceous Litter Cover
Great Basin	20 to 50%	25 to 4% depending on soil
Montane	65 to 80%	at least 40% depending on soil
Subalpine	>80%	>90%

[1] Depends on terrestrial ecosystem unit or soil type.

Fine Scale (10 acres or less)

6 Fine scale features such as rock piles and wet areas are present within Montane Grasslands to support rare plant species such as grassyslope sedge and Arizona sneezeweed.

7 Within site capability, a mosaic of vegetation density exists across the landscape ranging from densely vegetated areas that provide cover for ground-nesting birds and pronghorn fawns to bare areas that result from natural activities such as freeze–thaw action or prairie dog burrowing.

Objectives for Grassland Types[15]

Semidesert Grasslands

FW-Veg-Grass-SDG-O

1 Mechanically restore/enhance 3,500 acres of Semidesert Grasslands every 10-year period during the life of the plan.

Great Basin Grasslands

FW-Veg-Grass-GBG-O

1 Mechanically restore/enhance 10,800 to 12,400 acres of Great Basin Grasslands every 10-year period during the life of the plan.

Montane Subalpine Grasslands

FW-Veg-Grass-MSG-O

1 Mechanically restore/enhance 7,600 to 11,400 acres of Montane Subalpine Grasslands every 10-year period during the life of the plan.

[15] Objectives for Semidesert Grasslands and Great Basin Grasslands maintain and improve habitat for pronghorn, a management indicator species.

Standards for Grassland Types

Semi-Desert Grasslands

FW-Veg-Grass-SDG-S

1 Recreation goals are subordinate to antelope protection.

Guidelines for Grassland Types

All Grassland Types

FW-Veg-Grass-All-G

1 Disturbance from management activities in key pronghorn fawning areas during fawning season should be minimized to maximize reproductive success.

2 Natural waters within a quarter of a mile of fawning habitat should be maintained and available to pronghorn during the fawning season to maximize reproductive success.

Semidesert Grasslands

FW-Veg-Grass-SDG-G

1 Ground-disturbing activities should occur during times soil is dry especially soils with high clay content and low-bearing strength to minimize soil compaction, displacement, and trafficability problems.

2 Road and trail locations should consider antelope protection goals.

Great Basin and Montane/Subalpine Grasslands

FW-Veg-Grass-GB&MSG-G

1 Move toward 90 percent vegetative ground cover to reduce erosion and gully formation and maintain soil function and productivity.

2 New stock tanks and wildlife waters should be placed in locations that reduce concentrations of grazing animals and subsequent vegetation and soil effects in open areas.

3 To promote satisfactory soil conditions in Great Basin Grasslands, vegetation in soils classified with clayey (Vertic) subgroups should not be burned until vegetative ground cover is near potential conditions as listed in TES.

Management Approaches Grassland Types

Great Basin and Montane/Subalpine Grasslands

Provide media and public information focused on the unique properties of, and appropriate activities within, grasslands.

Collaborate with partners and stakeholders on grassland restoration, grassland connectivity, and education.

Coordinate with Arizona Game and Fish Department on objectives for wildlife conservation, education, habitat restoration, and improvements, particularly regarding pronghorn and prairie dogs.

Related Plan Content for Grassland Types

See the following: Soil; Wildlife, Fish, and Plants; Livestock Grazing

Interior Chaparral

See appendix A, map 7.

General Description and Background for Interior Chaparral

Interior Chaparral covers approximately 50,471 acres of the Coconino NF. Found between 3,750 and 7,300 feet in elevation, it is a fire-dependent PNVT and varies from widely scattered pockets within grasslands and woodlands to more extensive areas on steep slopes. Species composition and dominance vary across the broad range of soils and topography but are dominated by shrubs. Soil productivity is naturally low and most soils are inherently unstable due to the steep slopes.

Twenty-four percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Desired Conditions for Interior Chaparral

FW-Veg-IC-DC

Landscape Scale (10,000 acres or greater)

1 Interior Chaparral has vegetation with varying age classes and densities that protects against accelerated erosion and is maintained by frequent intervals of high-severity fires.

2 During early stages of succession, Interior Chaparral contains a grass and forb component in the understory. The mid- to late-development stages are dense, nearly impenetrable thickets with considerable (about 35 to 45 percent of soil surface) shrub litter (e.g., small stems, leaves). Standing dead material may accumulate in areas that have not burned for several decades. Greater than 70 percent of chaparral is mid- to late-development closed canopy with some openings of grasses and forbs. Canopy is more open at dry sites and more closed at wetter sites.

Table 5. Desired proportion of seral stages for Interior Chaparral

State	Reference Percent Composition	Description, Size, and Cover Class
Early: grass, forb	2%	Recently burned, sparsely vegetated, and all corresponding herb types.
Early-Mid: grass, shrub	5%	Grass and Shrub-Open. All corresponding shrub types.
Mid-Late: dense shrub, no understory	93%	Dense shrub-closed *and* all tree size and cover classes.

3 Interior Chaparral is in a constant state of transition from young to older stages and back again, with fire being the major disturbance factor. Natural high severity fires (75+ percent mortality or top kill) occur with a frequency of once every 35 to 100 years. Long fire return intervals allow for reestablishment of seed bank and development of fuel loads and spatial continuity of fuels necessary for fire.

4 Although soil productivity is generally low and most soils are inherently unstable on steep slopes, there is sufficient vegetation and litter cover to protect soil from accelerated erosion.

Mid-Scale (100 to 1,000 acres)

5 Fire hazard and severity is reduced in the wildland-urban interface (WUI) and, as a result, human life and property are protected. Vegetation conditions within the WUI are composed of younger and more widely spaced shrub patches. The frequency of disturbance (e.g., fire, vegetation treatments) within the WUI may be higher than the natural disturbance regime.

Fine Scale (10 acres or less)

6 Soils exhibit few signs of soil compaction or accelerated erosion. This, along with ground cover provided by litter and plant basal area, indicates that soil function is being sustained and soil is functioning properly and normally. Biological soil crusts are present to improve nutrient cycling and stabilize soils, especially in sandier soils.

Guidelines for Interior Chaparral

FW-Veg-IC-G

1 To provide varying seral stages and habitat diversity, fire treatments within Interior Chaparral should provide diversity of burn intensity within burn units, and at the landscape scale, burn unit locations should be rotated.

Management Approaches for Interior Chaparral

Emphasize coordination with local partners and stakeholders to reduce the risk of uncharacteristic fire (e.g., more frequent high intensity fires or uncharacteristically large fires) in the WUI on the Coconino NF and adjacent non-National Forest System lands.

Related Plan Content for Interior Chaparral

See the following: Soil; Fire Management

Piñon-Juniper Types

See appendix A, map 8.

General Description and Background for Piñon-Juniper Types

The Piñon-Juniper (PJ) Woodland vegetation community generally occurs at elevations between 2,500 and 8,300 feet and is collectively composed of the following PNVTs:

- Piñon-Juniper with Grass (includes Juniper Grasslands) generally occurs between 5,000 and 8,300 feet in elevation and covers about 261,432 acres of the forest.
- Piñon-Juniper Evergreen Shrub generally occurs between 2,564 and 6,942 feet in elevation and covers about 263,835 acres on the forest.
- Piñon-Juniper Woodlands (also called Persistent Piñon-Juniper) generally occurs between 2,997 and 7,489 feet in elevation and covers about 75,393 acres on the forest.

Piñon and juniper PNVTs are dominated by one or more species of piñon pine and/or juniper and can occur with a grass and forb dominated understory (i.e., Piñon-Juniper with Grass), a shrub dominated understory (i.e., Piñon-Juniper Evergreen Shrub), or a sparse discontinuous understory of some grasses and/or shrubs (i.e., Piñon-Juniper Woodlands). Two-needle and single-leaf piñon pine are common as well as one-seed, Utah, redberry, Rocky Mountain, and alligator juniper and a lesser abundance of oaks. Species composition and stand structure vary by location primarily due to precipitation, elevation, temperature, and soil type. In some locations, grassland soil types are interspersed with piñon-juniper soil types. Spreading, low intensity surface fires had a very limited role in molding stand structure and dynamics of many or most piñon and juniper woodlands in the historical landscape. However, where tree density is sparse and grass cover is significant, the Piñon-Juniper with Grass type may be an exception.

Sixty-three percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Desired Conditions for Piñon-Juniper Types

All Piñon-Juniper Types

FW-Veg-PJ-All-DC

1 Piñon-juniper types have a mosaic of trees and open areas that provide wildlife habitat, contribute to functional soils, and are resilient to natural disturbances and climate change.

2 There is connectivity of openings between trees that provide for sufficient sighting distance to facilitate pronghorn movement. Large snags and old trees with dead limbs and tops are persistent and scattered across the landscape. The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances (e.g. insects, diseases, and fire) and climate variability.

3 Pine stringers, noncontiguous narrow communities of predominantly ponderosa pine, extend below the normal elevation distribution of ponderosa pine, often into piñon and juniper, and they persist where they naturally occur.

4 Plant litter (e.g., leaves, needles) and coarse woody debris are present in sufficient quantity to resist accelerated soil erosion and promote nutrient cycling, water retention, and the microclimate conditions necessary for piñon seed germination. Large, coarse woody debris is present. There are sufficient nurse trees to provide microclimate conditions in the understory. Nurse trees provide improved nutrient and soil properties, higher soil moisture, lower temperatures, and light levels which increase piñon seedling survival under harsh conditions. Biological soil crusts are present to improve nutrient cycling and stabilize soils, especially in sandier soils.

5 There are opportunities for collecting forest products (e.g., firewood, piñon nuts, and posts and poles) consistent with other desired conditions.

6 On non-grassland soils, seral grasslands created by previous vegetation treatments, or pushes, in the piñon-juniper types trend toward restoration of desired conditions.

Piñon-Juniper with Grass

FW-Veg-PJ-PJG-DC

1 Piñon-Juniper with Grass is generally uneven-aged and open in appearance. Trees occur as individuals and small groups and range from young to old. Basal area ranges from 10 to 30 basal area per acre. Scattered shrubs and an herbaceous understory relative to site capability, including native grasses, forbs, and annuals, are present to support frequent surface fires and provide food and cover for wildlife. Shrubs, grasses, and vegetative ground cover (e.g., forbs, litter, and coarse woody material) maintain soil stability and soil productivity. Snags and older trees with dead limbs are scattered across the landscape.

Table 6. Desired proportion of seral stages for Piñon-Juniper with Grass

State	Desired Percent Composition	Size and Cover Class
Early Development	5%	Recently burned, grass, forb, and shrub types
Mid–Open	25%	Seed/saplings–open; Seed/saplings–closed; Small–open
Late–Open	50%	Medium–open, very large–open
Mid–Closed	10%	Small–closed
Late–Closed	10%	Medium–closed, very large–closed

2 Old growth structure occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Old-growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

3 Fires typically occur every 1 to 35 years with low severity and patches of mixed severity (Fire Regime I) favoring regrowth and germination of native grasses and forbs.

Piñon-Juniper Evergreen Shrub

FW-Veg-PJ-PJES-DC

1 Piñon-Juniper Evergreen Shrub is a mix of trees and shrubs that occurs as a series of vegetation states that move over time from herbaceous-dominated to shrub-dominated to tree-dominated. Trees occur as individuals or in smaller groups ranging from young to old. In later successional stages, basal area ranges from 10 to 40 square feet per acre. Piñon trees are occasionally absent but one or more juniper species is always present. Arizona cypress and live oak are scattered across the landscape. Typically groups are even-aged in structure with all ages represented across the landscape for an overall uneven-aged grouped appearance. The understory is dominated by low to moderate density of shrubs, depending on successional stage. The shrub component consists of one or a mix of evergreen shrub, oak, manzanita, mountain mahogany, sumac, and other shrub species, which are well distributed. A variety of low to high growing native perennial and annual grasses and forbs are present in the interspaces, and they maintain soil stability and soil productivity.

Table 7. Desired proportion of seral stages for Piñon-Juniper Evergreen Shrub

State	Desired Precent Composition	Size and Cover Class
Early Development	5%	Recently burned, grass, forb, and shrub types
Mid–Open	55%	Seed/saplings-open; Seed/saplings–closed; Small–open
Late–Open	40%	Medium–open, very large-open
Mid–Closed	0%	Small–closed
Late–Closed	0%	Medium–closed, very large–closed

2 Old growth structure occurs throughout the landscape, generally in small areas as individual old growth components or as clumps of old growth. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

3 Fires are typically mixed severity (25 to 75 percent mortality or top kill with a moderate frequency or Fire Regime III), while some evergreen shrub types exhibit occasional high severity fires (greater than75 percent mortality or Fire Regime IV). Vegetation conditions within the WUI may be composed of younger and more widely spaced shrub patches and tree groups so fires can be suppressed more easily when necessary.

Piñon-Juniper Woodlands (Persistent)

FW-Veg-PJ-PJW-DC

1 Piñon-Juniper Woodlands (or Persistent Piñon-Juniper) is characterized by even-aged patches of piñons and junipers that at the landscape level form multi-aged woodlands. Very old trees (greater than 300 years old) are present. Tree density is high and where interlocking crowns shade the ground over extensive areas, shrubs are sparse to moderate and herbaceous cover is low and discontinuous.

Table 8. Desired proportion of seral stages for Piñon-Juniper Woodlands

State	Desired Percent Composition	Size and Cover Class
Early Development	10%	Recently burned, grass, forb, and shrub types
Mid–Open	5%	Seed/saplings–open; Seed/saplings–closed; Small–open
Late–Open	10%	Medium–open; very large–open
Mid–Closed	15%	Small–closed
Late–Closed	60%	Medium–closed; very large–closed

2 Old growth structure generally occurs over large areas as stands or forests where old growth components are concentrated. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth

components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

3 The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances (e.g. insects, diseases, fire), and climate variability. Insects and disease occur at endemic levels. Fire as a disturbance is less frequent and variable due to differences in ground cover. The fires that do occur are mixed to high severity (Fire Regimes III, IV, and V).

Objectives for Piñon-Juniper Types

Piñon-Juniper with Grass

FW-Veg-PJ-PJG-O

1 Mechanically treat between 1,000 and 10,000 acres of Piñon-Juniper with Grass to move toward desired conditions during the 10 years following plan approval. Treatment priorities should move forest priority 6th code watersheds toward satisfactory conditions.

2 Using naturally ignited fires (i.e., lightning-caused fires), treat 3,750 acres with low to mixed severity fire during the 10 years following plan approval. Treatment priorities should move forest priority 6th code watersheds toward satisfactory conditions.

Piñon-Juniper Evergreen Shrub

FW-Veg-PJ-PJES-O

1 Using naturally ignited fires (i.e., lightning-caused fires), treat 3,750 acres with low to mixed severity fire during the 10 years following plan approval.

Guidelines for Piñon-Juniper Types

All Piñon-Juniper Types

FW-Veg-PJ-All-G

1 On grassland soil types, seral grasslands created by former vegetation treatments, or pushes, of Piñon-Juniper with Grass or Piñon-Juniper Evergreen Shrub should be maintained.

2 Grassland soil inclusions (also called Mollisol soils) with tree encroachment within the piñon-juniper types should be restored to grassland desired conditions.

3 In areas where there is little understory and treatments are proposed, slash treatments (e.g., lop and scatter and mastication) should be used that improve herbaceous vegetation growth, soil and watershed condition, and soil productivity[16].

4 If available and needed to support restoration activities, seeding with native species appropriate for the ecological unit (or similar in elevation, soil type, and ecosystem) should be used to restore the desired native species composition of the area.

Related Plan Content for Piñon-Juniper Types

See the following: Soil; Ponderosa Pine; Wildlife, Fish, and Plants; Fire Management

[16] The intent is to encourage response in herbaceous vegetation and allow smaller debris to decompose in place on the ground.

Ponderosa Pine

See appendix A, map 9.

General Description and Background for Ponderosa Pine

Ponderosa Pine covers approximately 792,000 acres of the Coconino NF and is found between 4,500 and 9,000 feet in elevation. It is adjacent to Flagstaff and numerous other communities. Besides ponderosa pine trees, other species commonly found in this PNVT are oak, juniper, and piñon. More infrequently species such as aspen, Douglas-fir, white fir, and blue spruce may be present in small groups or individual trees. There typically is an understory of grasses and forbs and sometimes shrubs.

Ponderosa Pine includes two subtypes: Ponderosa Pine Bunchgrass and Ponderosa Pine Gambel Oak. The Gambel Oak subtype is particularly important to many wildlife species, including Mexican spotted owls. Higher species richness has been correlated with higher densities of Gambel oak. This subtype provides important nesting and foraging habitat for wildlife. The desired conditions below apply to both subtypes. This community also contains unique features such as pine stringers—noncontiguous, narrow communities of predominantly ponderosa pine that extend below their normal elevation distribution into the Piñon-Juniper Woodlands and Grasslands PNVTS. Pine stringers provide connectivity between two vegetation communities as well as a unique microclimate in lower elevation environments.

Sixty-four percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Ponderosa Pine PNVT provides habitat for two management indicator species: the pygmy nuthatch (mature ponderosa pine and snags) and Mexican spotted owl (ponderosa pine-Gambel oak subtype).

Desired Conditions for Ponderosa Pine

FW-Veg PP-DC

Landscape Scale (10,000 acres or greater)

1 Ponderosa Pine has a mosaic of trees with varying age classes and understory vegetation which provide habitat for a variety of species, including Mexican spotted owls and northern goshawks, and ground fuels conducive to low-severity fires.

2 The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances and climate variability that is similar to conditions prior to 1850 (pre-fire disruption[17]). The landscape is a functioning ecosystem that contains its components, processes, and conditions that result from endemic levels of disturbances (e.g. insects, diseases, fire, and wind), including snags, downed logs, and old trees. Grasses, forbs, shrubs, and needle cast (e.g., fine fuels), and small trees maintain the natural fire regime. Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function.

[17] Pre-fire disruption is intended to refer to the period before human activities such as past grazing practices, logging, and fire suppression changed the way fire burned on the landscape, which is approximated to be before 1850.

3 Frequent, low-severity fires (Fire Regime I) are characteristic in this PNVT, including throughout northern goshawk home ranges. Spatial heterogeneity and discontinuous crowns (interspaces between groups and single trees) prevents fire spread. Natural and human disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.

4 At the landscape scale and as shown in table 9, Ponderosa Pine is composed of trees in structural stages that range from young to old and are dominated by ponderosa pine trees. Forest appearance is variable but generally uneven-aged and open; occasional areas of even-aged structure are present. Forest arrangement is in individual trees, small clumps, and groups of trees interspersed within variably sized openings of grasses, forbs, and shrubs that are similar to historic patterns. Openings typically range from 10 percent in more productive sites to 70 percent in the less productive sites. The size and shape of trees, number of trees per group, and number of groups per area are variable across the landscape. Denser tree conditions exist in some locations such as north-facing slopes and canyon bottoms.

Table 9. Desired proportion of seral stages for Ponderosa Pine[1]

State	Desired Percent Composition	Description, Size, and Cover Class
Early development	0%	Recently burned, grass, forb, and shrub types
Early forest	1.4%	Seed/saplings–open Seed/saplings–closed Conditions indicative of occasional even-aged stand dynamics and the development of closed mature forest habitat; >10% tree cover.
Young forest	1.4%	Small–open Conditions indicative of occasional even-aged stand dynamics and the development of closed mature forest habitat; <30% cover.
Mid-age forest, mature/old forest with regeneration	88%	Medium–open (even and uneven-aged) Very large–open (even and uneven-aged) Based on reference condition, and the predominance of uneven-aged dynamics and open forest. The plurality of stands on low-productivity sites likely to occur as medium-open/uneven-aged, versus high-productivity sites where very large-open/uneven-aged is more likely; <30% cover.
Young forest	1.4%	Small–closed Condition indicative of occasional even-aged stand dynamics and the development of closed mature forest habitat; >30% cover.
Mid-age forest, mature/old forest with regeneration	7.8%	Medium–closed (even and uneven-aged) Very large–closed (even and uneven-aged). Based on reference condition, and the predominance of uneven-aged dynamics and open forest. The plurality of stands on low-productivity sites likely to occur as medium–closed/uneven-aged, versus high-productivity sites where very large–closed/uneven-aged is more likely; >30% cover.

[1] Assumes 60 percent pine-bunchgrass and 40 percent pine-oak.

5 Ponderosa Pine is composed predominantly of vigorous trees, but declining trees are a component. Declining trees are well distributed across the landscape and may occur as clumps or individual trees. They provide for snags, top-killed, lightning-scarred and fire-scarred trees, and coarse woody debris (greater than 3-inch diameter, including large logs).

6 Old growth structure occurs throughout the landscape, generally in small areas as individual old-growth components, or as clumps of old growth. Consistent with vegetative characteristics of a frequent, low severity fire regime, old growth is a component of uneven-aged forests, generally comprised of groups of similarly aged trees and single trees interspersed with open grass–forb–shrub interspaces, but occasionally, it occurs in larger even-aged patches where local microsites facilitate less frequent fire regimes. Within group variability may be low but variation among groups is typically high and proportions of patches with different developmental stages may vary depending on site-specific conditions. Old growth components include old trees, dead trees (snags), and dead and downed wood (coarse woody debris including large size classes). Snags and large dead and downed fuels are irregularly distributed across the landscape and may not exist in some patches. The location of old growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

7 Where aspen is present, it is reproducing successfully. The young to old large aspens, snags, and downed logs provide habitat for a variety of wildlife species.

8 In the Gambel oak subtype, all sizes, structures (i.e., the shrub or tree forms depending on the capability of the site), and ages of oak trees are present. The Gambel oak subtype is reproducing and maintaining its presence on suitable sites across the landscape. Large to moderate sized oak snags are scattered across the landscape, as are moderate to large live oak trees with dead limbs, hollow boles, and cavities. These provide shelter and nesting habitat for a variety of wildlife species, including owls and bats.

Mid-Scale (100 to 1,000 acres)

9 At the mid-scale, Ponderosa Pine is characterized by variation in the size and number of tree groups depending on elevation, soil type, aspect, and site productivity. The more biologically productive sites contain more trees per group and more groups per area, resulting in less space between groups. At the mid-scale, openings typically range from 30 percent in more productive sites to 60 percent in the less productive sites, but extreme outlying sites can range from 10 percent (i.e., high elevation, mesic sites) and may be as much as 70 percent in low elevation sites on south-facing slopes. Tree density within forested areas generally ranges from 20 to 80 square feet basal area per acre.

10 The mosaic of tree groups generally comprises an uneven-aged forest with all age classes present, including old growth. Groups of seedlings and saplings are maintained at sufficient levels to provide a reliable source of replacement as trees grow and progress into succeeding size and age classes. Infrequently patches of even-aged forest structure are present. Disturbances sustain the overall age and structural distribution.

11 Ponderosa pine snags are typically 18 inches or greater diameter at breast height (d.b.h.) and average 1 to 2 snags per acre, but this can vary in space and time[18]. They are generally well

[18] Snags per acre and logs per acre are general measures of abundance at the fine scale and usually an average calculated from data collected at the mid-scale or higher.

distributed to meet the needs of species that use snags and to provide for future downed logs. There are varying sizes of snags greater than 18 inches d.b.h.. Downed logs (greater than 12-inch diameter at mid-point and greater than 8 feet long) average 3 logs per acre within the forested area of the landscape. Coarse woody debris, including large downed logs, is sufficient to maintain or improve long-term soil productivity and provide important wildlife habitat, and it is generally well distributed and averages from 3 to 10 tons per acre.

12 Diversity of understory species (e.g., grasses, forbs, and shrubs) is consistent with site potential and provides for infiltration of water and reduction of accelerated erosion. The understory has a variety of heights of cool and warm season vegetation and produces seed heads and all age classes of vegetation for food and cover for wildlife. A mosaic of dense cover and high amounts of litter and bare ground provide habitat for small mammals.

13 Fires burn primarily on the forest floor and do not spread between tree groups as crown fire. Single tree torching and isolated tree torching, however, is not uncommon, resulting in a mosaic across the landscape.

14 In order to reduce fire intensity and to maintain the ability to control fire in WUI, forest structure may be at the low range of desired conditions for levels of snags, logs, coarse woody debris, and tree density, and have groups of trees that are more widely spaced or have fewer trees per group (but still within desired condition) than in the non-WUI areas. Crown base heights may also be higher than non-WUI areas to reduce the likelihood of fire reaching the tree canopy.

15 Forest conditions in goshawk post-fledgling areas (PFAs) are similar to general forest conditions except these forests contain 10 to 20 percent higher basal area in mid-aged to old tree groups than in goshawk foraging areas and the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the Ponderosa Pine type.

Fine Scale (10 acres or less)

16 Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking. Openings surrounding tree groups are variably shaped and comprised of a grass/forb/shrub mix.

17 Some openings contain individual and randomly distributed patches of trees. Trees within groups are of similar or variable ages and may contain species other than ponderosa pine. Size of tree groups typically is less than 1 acre, but they may range from a few to many trees in extent and be larger in areas managed for bald eagles and Mexican spotted owls. Old-growth groups contain trees having similar age characteristics and conditions. Such groups may include fairly similar tree ages and sizes or combinations of ages and sizes, limited amounts of dead and downed material, and dead trees and spike tops, but they are readily distinguished from adjacent groups having different characteristics. Groups at the mid-aged to old stages consist of 2 to approximately 40 trees per group.

18 Dwarf mistletoe is an element of the forest landscape, including the Ponderosa Pine and Mixed Conifer forest types. There is a varied level of mistletoe across the landscape, comparable with historic conditions such that it does not impede achieving and sustaining uneven-aged forest structure. Witches brooms may form on infected trees, providing habitat for wildlife species.

19 Large oak trees and pine-oak groups in the Ponderosa Pine Gambel Oak subtype provide cooler, moister microsites and higher overstory diversity than surrounding the Ponderosa Pine Bunchgrass subtype. Gambel oak acorns provide food for wildlife species.

Objectives for Ponderosa Pine[19]

FW-Veg-PP-O

1 Use prescribed cutting (i.e., group selection or free thinning) to treat 50,000 to 260,050 acres of Ponderosa Pine during the 10 years following plan approval. Treatment priorities should move forest conditions within priority 6th code watersheds toward satisfactory conditions.

2 Use prescribed fire to underburn (low severity) 150,000 to 300,000 acres of Ponderosa Pine during the 10 years following plan approval. Treatment priorities should move forest conditions within priority 6th code watersheds toward satisfactory conditions.

3 Use naturally ignited fires (i.e., lightning-caused fires) to treat at least 135,000 acres with low-severity fire to move vegetation toward desired conditions during the 10 years following plan approval.

Guidelines for Ponderosa Pine

FW-Veg-PP-G

1 To protect old-growth forest components, existing old-growth forest attributes should be protected from uncharacteristic natural disturbances. Methods of protecting existing old-growth forest components on the landscape may include prescribed cutting, prescribed fire, and wildfires that include resource objectives.

2 To perpetuate old-growth forest components, the development of old-growth conditions should be encouraged in areas where old growth is lacking. Uneven-aged vegetation treatments should be designed such that replacement structural stages and age classes are proportionally present to assure continuous representation of old-growth characteristics across the landscape over time.

3 In promoting an uneven-aged forest condition that maintains or contributes to the restoration of old-growth conditions characteristic of the forest type, preference for retention should be given to presettlement trees, often the largest, oldest, and tallest trees onsite. For Ponderosa Pine, presettlement trees may be determined by the following characteristics described by Thomson (1940) as age class 3 (intermediate to mature) and age class 4 (mature to over-mature) (figures 4 and 5):

- **Age** – approximately 150 years and older.
- **Bark** – ranging from reddish brown, shading to black in the top with moderately large plates between the fissures to reddish brown to yellow, with very wide, long and smooth plates.

[19] Objectives for Ponderosa Pine move the PNVT toward desired conditions and indirectly maintain and improve habitat for the Mexican spotted owl and pygmy nuthatch, which are management indicator species.

- **Branching** – ranging from upturned in upper third of the crown, horizontal in the middle third and drooping in the lower third of the crown to mostly large, drooping, gnarled or crooked. Branch whorls range from incomplete and indistinct except at the top to completely indistinct and incomplete.

4 To promote old growth attributes consistent with desired conditions, manage for large Gambel oak trees and snags to be sustained over time.

5 To provide necessary habitat components, snags and downed logs should be emphasized along edges of openings and within groups/clumps of trees to provide habitat and roost sites for wildlife species such as small mammals, cavity-nesting birds, and tree-dwelling bats.

6 Management activities that result in accumulations of green slash should be timed to minimize potential impacts from bark beetles. Accumulating green slash before overwintering beetles emerge should be avoided, generally April to June.

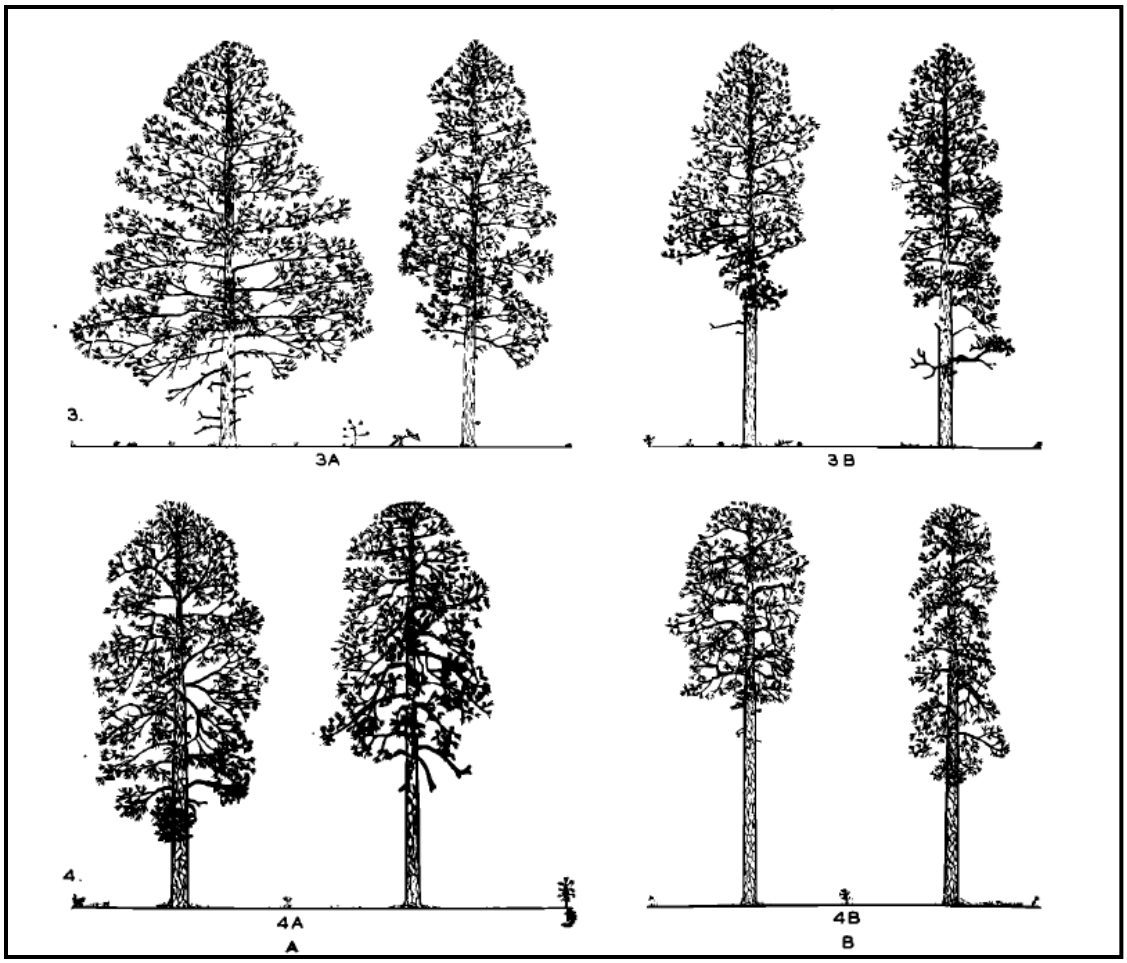

Figure 4. Illustration of ponderosa pine growth rate for age classes 3A, 3B, 4A, and 4B[20]

[20] Numbers under each illustration represent the age class, while the letters represent the vigor class. Vigor classes are as follows: A (Full), B (Medium), C (Light), and D (Weak) (Thomson, 1940).

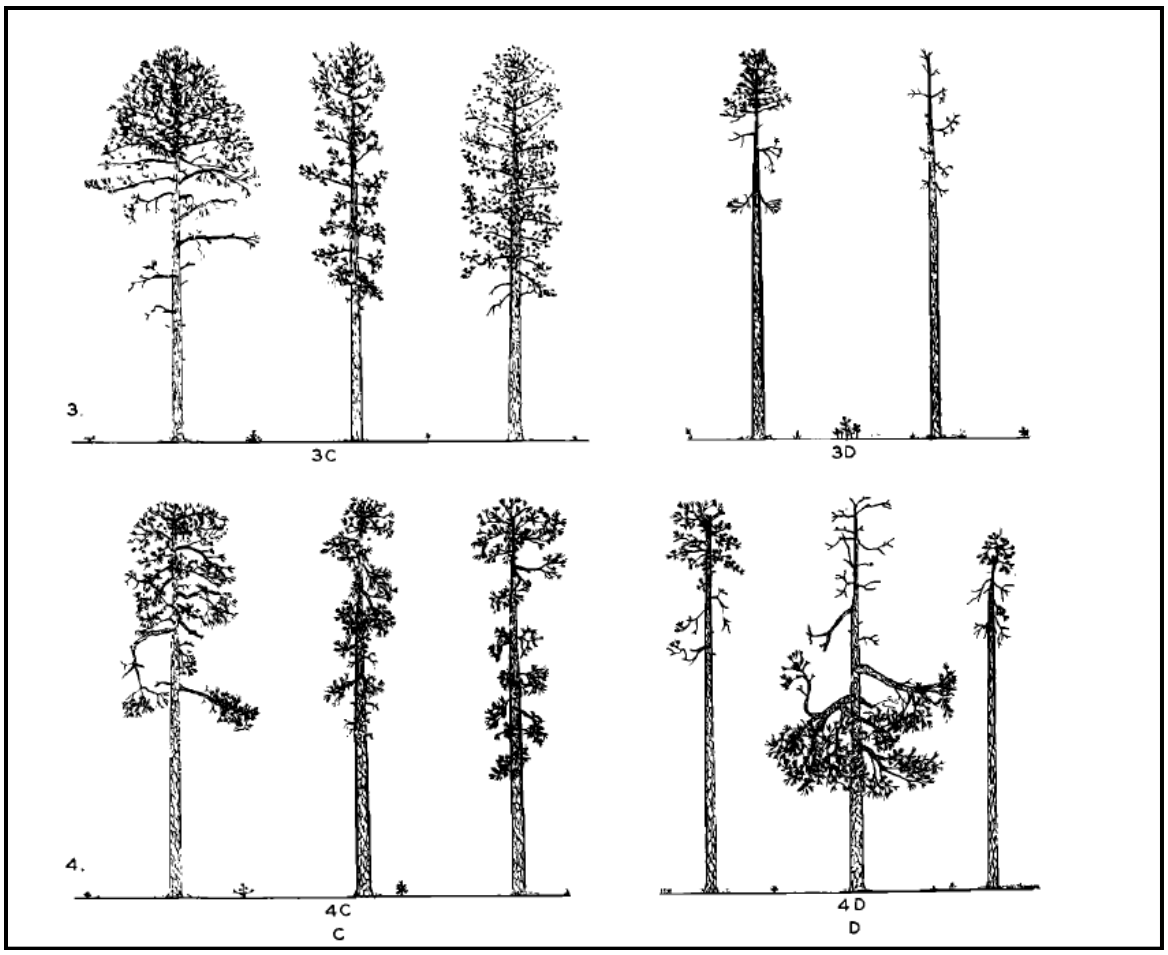

Figure 5. Illustration of ponderosa pine growth rate for age classes 3C, 3D, 4C, and 4D

7 To increase small mammal occupancy in areas where logs are deficient and to provide nesting habitat for turkeys, slash piles may be retained across the landscape for several years, rather than immediately being burned. This should be consistent with scenic integrity objectives (SIO) and balanced with potential threats from bark beetles and fire/fuels concerns.

Related Plan Content for Ponderosa Pine

See the following: Soil; Piñon-Juniper Types; Wildlife, Fish, and Plants; Fire Management; Forest Products; Pine Belt Management Area

Mixed Conifer Types

See appendix A, map 10.

General Description and Background for Mixed Conifer Types

All Mixed Conifer Types

Sixty-seven percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

These communities also contain unique features such as mixed conifer stringers—noncontiguous, narrow communities of predominantly Mixed Conifer that extend below their normal elevation distribution into other PNVTS. Mixed conifer stringers provide connectivity between two vegetation communities as well as a unique microclimate in lower elevation environments.

These Mixed Conifer PNVTs have higher biodiversity and different wildlife assemblages than Ponderosa Pine. In addition, they provide habitat for the Mexican spotted owl (MSO), a threatened species and management indicator species. Recommendations regarding Mexican spotted owl (MSO) habitat are contained in the "Mexican Spotted Owl Recovery Plan[21]."

Mixed Conifer with Frequent Fire

Mixed Conifer with Frequent Fire covers approximately 49,619 acres of the Coconino NF and is found between 4,700 and 8,900 feet in elevation (above Ponderosa Pine). It occurs on mountain slopes and may also occur in canyons and north-facing slopes. This PNVT occupies the warmer and drier sites of the mixed conifer life zone and is characterized by a historic fire regime of frequent, low-severity fires and infrequent, mixed-severity fires with a relatively open structure. These conifer forests are dominated by mainly shade intolerant trees such as: ponderosa pine, southwestern white pine, limber pine, and Gambel oak, with a lesser presence of New Mexican locust and big toothed maple. Moderately shade tolerant species such as Douglas-fir and white fir tend to increase in older stages of succession. Aspen may occur as small groups in north-facing slopes, drainages, and other microsites where cooler, moister conditions prevail.

This PNVT typically occurs with an understory of graminoids, forbs, and shrubs. The understory is similar to Ponderosa Pine, but it generally has more sedges, mosses, and liverworts. Big toothed maple primarily occurs on the Mogollon Rim Ranger District. Historically this PNVT had over 10 percent tree cover, with the exception of early, post-fire plant communities.

Mixed Conifer with Aspen (Infrequent Fire Mixed Conifer)

Mixed Conifer with Aspen covers approximately 37,083 acres of the Coconino NF and is generally found between 8,000 and 10,400 feet in elevation. It occurs on mountain slopes such as the San Francisco Peaks and may also occur in canyons and north-facing slopes such as on Hutch Mountain and Mormon Mountain. Tree species composition varies depending on seral stage, elevation, and moisture availability. This PNVT can be composed of dominant and codominant species such as: Douglas-fir, New Mexico locust, southwestern white pine and limber pine, and late seral species such as maple, white fir, and blue spruce. Ponderosa pine may be present in minor proportions. The absence of significant proportions of Engelmann spruce and/or corkbark fir distinguishes Mixed Conifer with Aspen from the Spruce-Fir PNVT. Historically, this PNVT had over 10 percent tree cover, with the exception of early, post-fire plant communities.

[21] As of December 2012, the U.S. Fish and Wildlife Service has completed a revised recovery plan (Fish and Wildlife Service, 2012).

Aspen occurs as groups. Its distribution is influenced by soil type, soil moisture, low temperatures, and disturbances that stimulate root sprouting and colonization. Aspen sites may or may not have a significant conifer component depending on successional status. Aspen regenerates successfully and is self-sustaining.

Disturbances typically occur at two temporal and spatial scales: large scale infrequent disturbances (mostly mixed severity fires at 35 to 200 year frequency or Fire Regime III) and small-scale, frequent disturbances (e.g., fire, insect, disease, wind).

Mixed Conifer with Aspen has an understory with a wide variety of shrubs, grasses, and forbs depending on soil type, aspect, elevation, disturbance, and other factors. In addition, it generally has more sedges, mosses, and liverworts than Mixed Conifer with Frequent Fire and more leaf litter because there are more deciduous species. Lichens may occur on the Douglas-fir trees. Understory vegetation tends to flower more in the spring and, compositionally, be more similar to vegetation in the adjoining Spruce-Fir PNVT or in canyons.

Desired Conditions for Mixed Conifer Types

All Mixed Conifer Types

FW-Veg-MC-All-DC

1 Mixed Conifer types have a mosaic of trees with varying age classes and understory vegetation which provide habitat for wildlife species, including Mexican spotted owls and northern goshawks; ground cover for healthy watersheds; and fuel for fire to occur according to historic ranges of frequency and severity.

Mixed Conifer with Frequent Fire

FW-Veg-MC-MCFF-DC

Landscape Scale (10,000 acres or greater)

1 At the landscape scale, Mixed Conifer with Frequent Fire is a mosaic of forest conditions composed of structural stages that range from young to old trees. This PNVT contains sufficient numbers of groups and patches of old growth to be representative of the forest type in historical times. However, portions of the forest may be in various stages of development (even temporary openings or groups of very young trees) to provide future old-growth structure in the landscape.

Table 10. Desired proportion of seral stages for Mixed Conifer with Frequent Fire

State	Desired Percent Composition	Description, Size, and Cover Class
Early development, all structures	9%	Seed/saplings–open Seed/saplings–closed Recently burned, grass, forb, and shrub types, and conditions indicative of even-aged stand dynamics and the development of MSO habitat.
Mid-development, open	3%	Small–open Reference condition, and conditions indicative of even-aged stand dynamics and the development of MSO habitat.

State	Desired Percent Composition	Description, Size, and Cover Class
Late development, open	60%	Medium–open (even and uneven-aged) Very large–open (even and uneven-aged) Based on reference condition and the predominance of uneven-aged dynamics and open forest. The plurality of stands on low-productivity sites likely to occur as medium–open/uneven-aged, versus high-productivity sites where very large–open/uneven-aged is more likely.
Mid-development, closed	3%	Small–closed > 30% cover Reference condition and conditions indicative of even-aged stand dynamics and the development of MSO habitat.
Late development, closed	25%	Medium–closed (even and uneven-aged) Very large–closed (even and uneven-aged) > 30% cover Conditions indicative of mature closed forest habitat and occasional even-aged dynamics that occurred in the reference condition (Romme et al., 2010), particularly on north-facing slopes and canyons. The plurality of stands on low-productivity sites likely to occur as medium–closed, versus high-productivity sites where very large–closed is more likely.

2 Old-growth structure occurs throughout the landscape, generally in small areas as individual old-growth components or as clumps of old growth. Old-growth components include old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old-growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). Old growth is often mixed with groups of younger trees or as individual groups of mostly old trees.

3 Forest appearance is variable but generally uneven-aged and open; occasional patches of even-aged structure are present. Forest arrangement is in small clumps, groups, single trees, and patches of trees that are interspersed within variably sized openings of graminoids, forbs, and shrubs similar to historic patterns. Openings typically range from 10 percent in more productive forested sites to 50 percent in the less productive forested sites. The size and shape of trees, number of trees per group, and number of groups per area are variable across the landscape. Where they naturally occur, groups and patches and all structural stages of oak are present. Denser tree conditions exist in some locations such as north-facing slopes and canyon bottoms.

4 Mixed Conifer with Frequent Fire is composed predominantly of vigorous trees, but declining trees are a component. Declining trees are well distributed throughout the landscape and provide for snags; top-killed, lightning-scarred, and fire-scarred trees; and coarse woody debris (greater than 3-inch diameter). A variety of snag species and coarse woody debris are well distributed throughout the landscape.

5 The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances and to climate variability. The landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g., insects, diseases, fire, and wind) including: snags,

downed logs, and old trees. Graminoids, forbs, shrubs, needle cast (e.g., fine fuels), and small trees maintain the natural fire regime.

6 Organic ground cover and native herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Frequent, low-severity fires (Fire Regime I) are characteristic. Natural and human-caused disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling.

Mid-Scale (100 to 1,000 acres)

7 At the mid-scale, Mixed Conifer with Frequent Fire is characterized by variation in the size and number of tree groups, depending on elevation, soil type, aspect, and site productivity. The more biologically productive forested sites contain more trees per group and more groups per area. Openings typically range from 10 percent in more productive sites to 50 percent in the less productive sites. Tree density within forested areas generally ranges from 30 to 100 square feet basal area per acre. Denser tree conditions exist in some locations such as north-facing slopes and canyon bottoms.

8 The mosaic of tree groups generally comprises an uneven-aged forest with all age classes and structural stages, including old growth. Groups of seedlings and saplings are maintained at sufficient levels to provide a reliable source of replacement as trees grow and progress into succeeding size and age classes. Occasionally small patches (generally less than 50 acres) of even-aged forest structure are present. Disturbances sustain the overall age and structural distribution.

9 Snags are typically 18 inches or greater at d.b.h. and average 3 per acre. Downed logs (greater than 12-inch diameter at mid-point and greater than 8 feet long) average 3 per acre within the forested area of the landscape[22]. They are generally well distributed to meet the needs of species that use snags and to provide for future downed logs. Coarse woody debris (greater than 3-inch diameter), including downed logs, ranges from 5 to 15 tons per acre to maintain long-term soil productivity and provide important wildlife habitat.

10 Frequent low-severity fires (generally less than 25 percent mortality or topkill) occurring every 1 to 35 years are characteristic of this PNVT, including throughout the range of Mexican spotted owls and northern goshawks. Fires burn primarily on the forest floor but may result in single to group tree torching. Grasses, forbs, shrubs, and needle cast (e.g., fine fuels) maintain the natural fire regime with a greater proportion of the ground cover as grasses and forbs as opposed to needle cast.

11 While still remaining within the range of desired conditions, forest structure in the WUI may be composed of smaller and more widely spaced groups of trees and lower levels of snags, logs, and coarse woody debris than non-WUI areas in order to reduce fire intensity and to maintain the ability to control fire in WUI.

12 Basal area per acre for mid-aged to old tree groups in northern goshawk PFAs is 10 to 20 percent higher than northern goshawk foraging areas and the general forest. Goshawk nest areas have forest conditions that are multi-aged but are dominated by large trees with

[22] Snags per acre and logs per acre are general measures of abundance at the fine scale and usually an average calculated from data collected at the mid-scale or higher.

relatively denser canopies than other areas in the dry mixed conifer type, consistent with current technical guides for northern goshawk in the southwestern U.S.

13 Where they naturally occur, all age classes of aspen and maple are present in groups or patches and are regenerating and vigorous. A diverse understory comprised of native herbaceous and shrub species has a variety of seral and age classes and is vigorous and regenerating.

Fine Scale (10 acres or less)

14 Trees typically occur in irregularly shaped groups and are variably spaced with some tight clumps. Crowns of trees within the mid-aged to old groups are interlocking or nearly interlocking. Old-growth groups are trees having similar characteristics and conditions. Such groups may include fairly similar tree ages and sizes or combinations of ages and sizes, limited amounts of dead and downed material, and dead trees and spike tops, but they are readily distinguished from adjacent groups having different characteristics (Kaufmann et al., 2007). In local areas, trees are randomly distributed. Openings surrounding tree groups and patches are variably shaped and comprised of a mix of graminoids, forbs, and shrubs. Some openings contain individual trees or snags.

15 Trees within groups are of similar or variable ages and one or more species. Size of tree groups typically is less than 1 acre. Groups at the mid-age to old stages consist of approximately 2 to 50 trees per group.

16 Dwarf mistletoe is an element of the forest landscape, including the ponderosa pine and mixed conifer forest types. There is a varied level of mistletoe across the landscape, comparable with historic conditions such that it does not impede achieving and sustaining uneven-aged forest structure. Witches brooms may form on infected trees, providing habitat for wildlife species.

17 Fine scale features such as rock piles and wet areas, which are necessary to support rare plant species, are well distributed and maintained within the capacity of this PNVT.

Mixed Conifer with Aspen

FW-Veg-MC-MCA-DC

Landscape Scale (10,000 acres or greater)

1 At the landscape scale, Mixed Conifer with Aspen is a mosaic of structural and seral stages ranging from young trees to old. The landscape arrangement is an assemblage of variably sized and aged groups of trees and other vegetation similar to historic patterns. Tree groups and patches are comprised of variable species composition depending on forest seral stages. An approximate balance of seral stages is present across the landscape, each seral stage is generally characterized by distinct dominant species composition and biophysical conditions. Old canopies are generally more closed than in Mixed Conifer with Frequent Fire. An understory consisting of native graminoids, forbs, and/or shrubs is present.

Table 11. Desired proportion of seral stages for Mixed Conifer with Aspen

State	Desired Percent Composition	Description, Size, and Cover Class
Early development	7%	Recently burned, grass/forb with aspen or oak ramets, 10–40% tree cover.
All aspen and evergreen-deciduous mix tree types	21%	Seed/saplings, small, medium, and very large – all cover classes. Aspen/mixed-aspen forest, >40% tree cover, dominated by aspen or oak, conifer understory.
Early, middle development	18%	Seed/saplings, small – all cover classes Seed/saplings–open, small–open Mixed conifer forest with regeneration, 20–60%+ tree cover (shade intolerant trees).
Middle, late development	14%	Medium – all cover classes Mixed conifer forest with regeneration, 20–60%+ tree cover (shade intolerant, intermediate, and tolerant trees).
Late development–closed	40%	Very large–closed Mixed conifer old forest with regeneration, 20–60%+ tree cover. Higher proportions can be expected for associations with longer stand replacement intervals (shade intolerant and tolerant trees).

2 Old growth structure generally occurs over large areas as stands or patches where old growth attributes are concentrated. Old growth components include old trees, dead trees (snags), downed wood (coarse woody debris), and structural diversity. The location of old growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

3 Mixed Conifer with Aspen is composed predominantly of vigorous trees, but older declining trees are a component. Declining trees are well distributed throughout the landscape and provide for snags; top-killed, lightning-scarred, and fire-scarred trees, and coarse woody debris. Number of snags and the amount of downed logs (greater than 12-inch diameter at mid-point and greater than 8 feet long) and coarse woody debris (greater than 3-inch diameter) vary by seral stage.

4 The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances and climate variability. The forest landscape is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g., insects, diseases, wind, and fire), including: snags, downed logs, and old trees. Mixed severity fire (Fire Regime III) is characteristic. High-severity fires (Fire Regimes IV and V) rarely occur. Natural and human disturbances are sufficient to maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling. Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. Mosses and lichens are prevalent and function for recycling soil nutrients.

Mid-Scale (100 to 1,000 acres)

5 At the mid-scale, the size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary but are frequently in the hundreds of acres, with rare disturbances in the thousands of acres. Groups and patches of tens of acres or less are relatively common. A mosaic of groups and patches of trees, primarily even-aged, but variable in size, species composition, and age is present. Grass, forb, and shrub openings created by disturbance may comprise 10 to 100 percent of the mid-scale area, depending on the disturbances and on amount of time since disturbance.

6 Tree density ranges from 20 to 180 square feet basal area per acre depending upon time since disturbance and seral stages of groups and patches. Snags 18 inches or greater at d.b.h. average from 1 to 5 snags per acre, with the lower range of snags of this size associated with early seral stages and the upper range associated with late seral stages[22]. Snag density in general (greater than 8 inches d.b.h.) averages 20 per acre and provides wildlife habitat and future downed logs. Coarse woody debris, including downed logs, varies by seral stage, with averages ranging from 5 to 20 tons per acre for early seral stages; 20 to 40 tons per acre for mid-seral stages; and 35 tons per acre or greater for late-seral stages. Coarse woody debris and logs provide for long term soil productivity.

7 Quaking aspen exists within the successional stage mosaic in this PNVT, providing habitat for those organisms dependent on it. Organisms present in aspen groves include native plant species such as Colorado blue columbine and Rusby milkvetch, native animals such as woodpeckers, and a variety of fungi and microorganisms. Where they naturally occur, all age classes of aspen and maple are present in even-aged groups or patches, which collectively contribute to a variable-aged landscape, and are regenerating and vigorous. A diverse understory comprised of native herbaceous and shrub species has a variety of seral and age classes and is vigorous and regenerating.

8 Mixed (Fire Regime III) and high (Fire Regime IV) severity fires and other disturbances maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling. High-severity fires generally do not exceed 1,000-acre patches of mortality. Other smaller disturbances occur more frequently. Forests in the WUI are dominated by early seral, fire-adapted species growing in a more open condition than the general forest. These conditions result in fires that burn primarily on the forest floor and rarely spread as crown fire.

9 Basal area per mid-aged to old tree group in northern goshawk PFAs is 10 to 20 percent higher than northern goshawk foraging areas and the general forest. Nest areas have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas in the Wet Mixed Conifer type.

Fine Scale (10 acres or less)

10 In mid-aged and older forests, trees are typically variably spaced with crowns interlocking (grouped and clumped trees) or nearly interlocking. Trees within groups can be of similar or variable species and ages. Locally, patches of random tree distribution are present. Small openings (gaps) are present as a result of disturbances.

11 Openings that support grasses, forbs, and shrubs are periodically created by disturbance to provide habitat for species such as Rusby milkvetch.

12 Natural openings and meadows are well distributed throughout this PNVT. They provide habitat for rare species such as Colorado blue columbine, Rusby milkvetch, Oregon willow herb, and timberland blue-eye grass. These openings are maintained by natural processes and exist within this PNVT in quantities and qualities adequate enough to allow for the persistence of these species as members of the native plant community. Fine scale features, such as rock piles and wet areas which are necessary to support these rare plant species, are well distributed within the capacity of this PNVT.

Objectives for Mixed Conifer Types[23]

Mixed Conifer with Frequent Fire

FW-Veg-MC-MCFF-O

1 Mechanically thin using methods such as group selection and free thinning 14,000 acres during the 10 years following plan approval.

2 Use prescribed fire on at least 8,000 acres (low-severity fire only) of Mixed Conifer with Frequent Fire during the 10 years following plan approval. Treatment priorities should move forest priority 6th code watersheds toward satisfactory conditions.

3 Use naturally ignited fires (i.e., lightning-caused fires) to treat at least 7,500 acres with low-severity fire during the 10 years following plan approval.

Guidelines for Mixed Conifer Types

Mixed Conifer with Frequent Fire

FW-Veg-MC-MCFF-G

1 To retain structural diversity, existing and developing old-growth forest structures should be protected from uncharacteristic disturbances. Methods of protecting existing old growth may include thinning, prescribed fire, and the use of wildfire with resource objectives in adjacent areas, especially those areas that are situated upwind or are topographically lower.

2 To promote structural diversity, the development of old-growth structural components should be encouraged in areas where lacking. Vegetation treatments should be designed such that replacement structural stages and age classes are proportionally present to assure continuous representation of old-growth characteristics across the landscape over time.

Related Plan Content for Mixed Conifer Types

See the following: Soil; Wildlife, Fish, and Plants; Fire Management

Spruce-Fir

See appendix A, map 12.

[23] Objectives for Mixed Conifer Frequent Fire move the PNVT toward desired conditions and indirectly maintain and improve habitat for the Mexican spotted owl, a management indicator species.

General Description and Background for Spruce-Fir

Spruce-Fir covers approximately 13,946 acres of the Coconino NF and is generally found between 8,400 and 12,000 feet in elevation. Spruce-Fir is often dominated by Engelmann spruce, but contains other species depending on elevation. The understory commonly includes currants, maples, honeysuckle, common juniper, alpine clover, and sedges. Spruce-Fir occurs within Kachina Peaks Wilderness and represents some of the coldest, wettest, and highest elevation sites on the forest.

Spruce-Fir can be subdivided into lower elevation (Spruce-Fir Mix) and upper elevation (Subalpine Spruce-Fir), each with differing fire regimes and subdominant species composition. The lower elevation subtype typically occurs between 9,500 and 10,500 feet; while the upper elevation subtype typically occurs between 10,500 and about 11,500 feet and is bounded by Alpine Tundra vegetation above 11,500 feet.

The lower elevation subtype resembles Mixed Conifer with Aspen except with a different composition of tree species, due to colder and wetter conditions, and it is a transition zone between Mixed Conifer with Aspen and the upper elevation Spruce-Fir subtype. In the lower elevation subtype, the common tree species are aspen, Douglas-fir, white fir, and southwestern white/limber pine. The climax forest is dominated by Engelmann spruce, white fir, and occasionally blue spruce. Subdominant species may include corkbark/subalpine fir, white fir, and bristlecone pine. In the upper elevation subtype, the dominant tree species are Engelmann spruce and corkbark fir (subalpine fir). Patches of aspen are occasionally present but are usually absent. Disturbances in these subtypes typically occur at two temporal and spatial scales; large-scale, infrequent disturbances (mostly fire) and small-scale, frequent disturbances (e.g., fire, insect, disease, and wind).

Nine percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Desired Conditions for Spruce-Fir

FW-Veg-SF-DC

Landscape Scale (10,000 acres or greater)

1. Spruce-Fir has a mosaic of trees with varying age classes and understory vegetation which infiltrates water, protects soils, and provides structure and composition that is resilient to the frequency, extent, and severity of disturbances and climate variability.
2. Spruce-Fir is a functioning ecosystem that contains all its components, processes, and conditions that result from endemic levels of disturbances (e.g. insects, diseases, fire, avalanches, and wind), including old trees, downed logs, and snags. Spruce-Fir is a mosaic of structural and seral stages ranging from young trees to old and is composed of multiple species. The landscape arrangement is an assemblage of variably sized and aged groups and patches of trees and other vegetation similar to historic patterns. An understory consisting of native grass, forbs, sedges, mosses, liverworts, and/or shrubs is present.

Table 12. Desired proportion of seral stages for Spruce-Fir

State	Desired Percent Composition	Description, Size, and Cover Class
Early development	9%	Grass/forb seedling/sapling with aspen, Douglas-fir, spruce, fir, 10–40% tree cover.
Early forest	13%	Seed/saplings, small, medium, and very large – all cover classes. Grass/forb seedling/sapling with aspen, Douglas-fir, spruce, fir. Aspen/mixed – aspen, 0–10%.
Early, middle development	22%	Seed/saplings, small – all cover classes Seed/saplings – open, small-open Conifer early forest, 10–20%. Grass/forb seedling/sapling with aspen, Douglas-fir, spruce, fir. Aspen/mixed – aspen early forest, 0–10% (shade intolerant, intermediate and tolerant trees).
Young forest with regeneration	15%	Medium – all cover classes (shade intolerant, intermediate, and tolerant trees)
Mature/old forest with regeneration	44%	Very large–closed Mature/old forest with regeneration (shade intolerant and tolerant trees)

3 Old-growth characteristics generally occur over large areas as stands or patches where old-growth components are concentrated. Old-growth components include old trees, dead trees (snags), downed wood (coarse woody debris) and structural diversity. The location of old-growth components shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality).

4 Spruce-Fir is composed predominantly of vigorous trees, but older declining trees are a component. Declining trees are well distributed throughout the landscape and provide for snags; top-killed, lightning-scarred and fire-scarred trees; and coarse woody debris. The number of snags and amount of downed logs (greater than12-inch diameter at mid-point and greater than 8 feet long) and coarse woody debris (greater than 3-inch diameter) vary by seral stage.

5 The composition, structure, and function of vegetation conditions are resilient to the frequency, extent, and severity of disturbances and to climate variability. Organic ground cover and herbaceous vegetation provide protection of soil, moisture infiltration, and contribute to plant and animal diversity and to ecosystem function. In the lower elevation subtype, mixed-severity fires (Fire Regime III) infrequently occur. In the upper elevation subtype, high-severity fires (Fire Regime IV and V) occur very infrequently. Natural and human-caused disturbances are sufficient to maintain desired overall tree density, structure, species composition, spongy coarse woody debris, and nutrient cycling.

6 Natural openings and subalpine meadows are present throughout this PNVT. They provide habitat for rare species such as Colorado blue columbine, graceful buttercup, spider saxifrage, and timberland blue-eye grass. Openings are maintained by natural processes and exist within the PNVT in quantities and qualities adequate enough to allow for the persistence of these species as members of the native plant community. Natural openings and subalpine meadows are well distributed throughout this PNVT. Fine scale features such

as rock piles and wet areas, which are necessary to support these rare plant species, are well distributed within this PNVT.

Mid-Scale (100 to 1,000 acres)

7 At the mid-scale, the size and number of groups and patches vary depending on disturbance, elevation, soil type, aspect, and site productivity. Patch sizes vary but are mostly in the hundreds of acres, with rare disturbances in the thousands of acres. There may be frequent small disturbances resulting in groups and patches of tens of acres or less. A mosaic of groups and patches of trees, primarily even-aged, that are variable in size, species composition, and age is present. Grass, forb, and shrub openings created by disturbance may comprise 10 to 100 percent of the mid-scale area following major disturbance and depending on time since disturbance.

8 Aspen is occasionally present in large patches providing habitat for those organisms dependent on it. Organisms present in aspen groves include native plant species such as the Colorado blue columbine and Rusby milkvetch, native animals such as woodpeckers, and a variety of fungi and microorganisms.

9 Tree density ranges from 20 to 250 square feet basal area per acre, depending upon disturbance and seral stages of the groups and patches. Snags 18 inches or greater at d.b.h. range from 1 to 3 snags per acre, with the lower range of snags this size associated with early seral stages and the upper range associated with late seral stages[22]. Snag density in general (greater than 8-inches d.b.h.) averages 20 per acre with a range of 13 to 30 and provides habitat for wildlife species and future downed logs. Coarse woody debris, including downed logs, averages vary by seral stage, ranging from 5 to 30 tons per acre for early seral stages; 30 to 40 tons per acre for mid-seral stages; and 40 tons per acre or greater for late-seral stages and provide for long term soil productivity.

10 Mixed (Fire Regime III) and high (Fire Regimes IV and V) severity fires and other disturbances maintain desired overall tree density, structure, species composition, coarse woody debris, and nutrient cycling. Localized, accelerated soil erosion occurs following high-severity fires, but it does not occur to the extent that it risks long-term impairment to connected waters downstream or causes loss of soil productivity over major portions of the 5^{th} or 6^{th} code watershed.

11 The WUI is comprised primarily of grass/forb/shrub vegetation. Structures in the WUI are surrounded by grassy openings with very few or no trees. These conditions result in ground fires.

12 Forest conditions in goshawk post-fledgling family areas (PFAs) are similar to general forest conditions except PFAs contain 10 to 20 percent greater tree density (basal area) than goshawk foraging areas and the general forest. Nest areas in Spruce-Fir have forest conditions that are multi-aged but are dominated by large trees with relatively denser canopies than other areas.

13 Soil and vegetation disturbance from management activities occur in confined, localized areas where impacts to long term soil and vegetation condition are minimal.

Fine Scale (10 acres or less)

14 Mid-aged to old trees grow tightly together with interlocking crowns. Trees are generally of the same height and age in early group/patch development but may be multilayered in late development. Small openings (gaps) are present as a result of disturbances.

15 Invasive species are absent or present at minimum levels and do not degrade ecosystem integrity.

Guidelines for Spruce-Fir

FW-Veg-SF-G

1 Soil and vegetation disturbance from management activities should occur in confined, localized areas where impacts to soil condition and vegetation is minimized to maintain long term soil productivity and continue moving the majority of the 6th code watershed towards a functioning Class 1 watershed.

Related Plan Content for Spruce-Fir

See the following: Soil; Wildlife, Fish, and Plants; Fire Management

Alpine Tundra

See appendix A, map 12.

General Description and Background for Alpine Tundra

Alpine Tundra covers approximately 941 acres of the Coconino NF. Found within Kachina Peaks Wilderness, it begins around 10,300 feet in elevation and continues to the top of Humphreys Peak, the highest point in Arizona. This is the only area of Alpine Tundra and the only area containing bristlecone pines located on National Forest System lands in Arizona; it is also one of the southernmost extents of Alpine Tundra in the continental U.S.

Alpine Tundra consists of three main habitat associations: boulder fields, talus slopes, and alpine tundra meadows. Krummholz (i.e., areas of dwarfed, wind twisted trees) occurs near tree line where trees transition to Alpine Tundra vegetation. This PNVT typically has sparse vegetation including grasses, forbs, lichens and low shrubs, and it supports a federally threatened plant—San Francisco Peaks ragwort—that is only found here, as well as other endemic plant species.

Vegetation is controlled by temperature and the presence of soil, wind, snow accumulation, slope, and aspect. Episodic weather related factors are the major natural disturbance processes and include extreme temperatures, solar radiation, high winds, avalanches, and moisture. Wildland fires and invasive or noxious weeds have had little to no effect on this habitat; however, off-trail recreation can trample plants and damage habitat.

Major human disturbances are developed recreation from the ski area and year-round dispersed recreation, mainly outside of winter. There is a popular trail leading to Humphreys Peak.

The Alpine Tundra vegetation zone is probably the most significant cultural area on the Coconino NF. One of the reasons is that it contains shrines that are the focal points of prayers for many tribes in the Southwest.

One percent of the plants known to be used by tribes that traditionally use the forest occur in this ecosystem.

Desired Conditions for Alpine Tundra

FW-Veg-AT-DC

1 The plants, animals, and geological features which contribute to the ecological diversity and uniqueness of Alpine Tundra are maintained.

2 The ecosystem diversity of Alpine Tundra is maintained. In addition, it maintains the ecological attributes and processes that provide habitat for native biota, panoramic vistas, and/or solitude. The mountain maintains attributes that provide historic and cultural values. Alpine Tundra displays a diverse composition of native species and vegetation communities (including boulder fields, talus slopes, and meadows). Invasive species are absent.

3 Alpine Tundra provides habitat for San Francisco Peaks ragwort; is able to support and sustain rare or endemic species; and continues to be resilient to natural and human-caused impacts.

4 Tribal and recreational uses occur such that the uniqueness of the vegetation and ecological attributes are maintained.

Standards for Alpine Tundra

FW-Veg-AT-S

1 Recreation activities, including new route construction, shall avoid important habitat for the San Francisco Peaks ragwort and result in minimal disturbance to its habitat.

Related Plan Content for Alpine Tundra

See the following: Soil; Caves, Cliffs, and Talus Slopes; Wildlife, Fish, and Plants; Dispersed Recreation; Kachina Peaks Wilderness

Wildlife, Fish, and Plants

General Description and Background for Wildlife, Fish, and Plants

Species are dependent on the health of their habitats. Species viability is addressed in the plan by providing guidance to maintain and/or enhance habitat elements that are important for species found on the forest in addition to addressing species-specific threats. In that way, guidance to manage species is also found in the sections of this plan that relate to their habitats.

The wide range of habitats on the Coconino NF—extending from alpine tundra to lowland desert—creates a biologically rich landscape which supports a diversity of wildlife, fish, and plant populations. The forest is home to over 500 vertebrate species, including at least 300 species of birds; almost 100 species of mammals; a wide variety of amphibians and reptiles; 16 native fish species; invertebrates; as well as a variety of fungi, mosses, and plants.

Wildlife, fish, and rare plant resources have a valuable contribution within the Southwestern Region. Of the 11 national forests in the Southwestern Region, the Coconino NF has the second highest number of acres of lake habitat and the third highest number of miles of stream habitat. The forest contains Fossil Creek, the only stream in Arizona with a large assemblage of native

fish that is free of nonnative fish. Fossil Creek contains eight native fish species as well as the last robust population of lowland leopard frogs on the forest. The first bald eagle nest in Arizona was documented at Stoneman Lake in the late 1800s, and the largest concentration of bald eagles ever counted in Arizona (120 eagles) was documented in 1995 on the forest near Mormon Lake. Of interest, the forest contains Oak Creek, which supports the highest caddisfly species richness of any Arizona stream, including more than one-third of Arizona's entire caddisfly fauna.

The forest provides habitat for a large number of special status species. At the writing of this plan, there were 84 species listed as threatened, endangered, and sensitive species on the Coconino NF. Seventeen were federally listed under the Endangered Species Act as threatened, endangered, or proposed or were identified as candidate species. Sixty-seven species were classified as sensitive species on the Southwestern Region sensitive species list (Forest Service, 2007). Aquatic and riparian species dominated the list of special status species. Of note, 15 of 16 native fish species that occur and/or historically occurred on the forest were federally listed or classified as sensitive by the Southwestern Region at the time of plan approval.

People enjoy high-quality hunting, fishing, and wildlife viewing on the Coconino NF. Nine of the 10 big game species in the State occur on the forest, including: black bear, bighorn sheep, elk, javelina, turkey, mountain lion, pronghorn, mule deer, and white-tailed deer. Buffalo is the only big game species that does not occur. Seven of the nine small game species have abundant habitat on the forest, and there are also opportunities to hunt waterfowl, predators, and furbearers.

Fishing opportunities are abundant. The Arizona Game and Fish Department manages about 27 sport fish species in the State, and the Coconino NF provides angling opportunities for most of those species in stream and lake habitats. Of the 27 sport fish species, most have been introduced to the State from elsewhere, but Apache trout, desert sucker, and roundtail chub are native sport fish. Gila trout were native to the Verde watershed on the forest but have become extinct in these locations. The forest provides a unique opportunity to fish for native roundtail chub in portions of Fossil Creek.

Wildlife viewing is one of the most popular recreational activities on the forest. Three wildlife viewing areas on the forest are identified in the wildlife viewing publications for Arizona: Mormon Lake-Doug Morrison Overlook, Kendrick Park Watchable Wildlife Trail, and Upper and Lower Lake Mary. The National Audubon Society recognizes Anderson Mesa as a globally important bird area (IBA), Lower Oak Creek as a State IBA, and Mogollon Rim Snowmelt Draws as an identified but not yet designated IBA.

People also enjoy photography and aspen and wildflower viewing. Three botanical areas offer plant viewing.

Desired Conditions for Wildlife, Fish, and Plants

FW-WFP-DC

1 Sustainable populations of native and desirable nonnative plant and animal species, including special status species, are supported by healthy ecosystems and ecologically responsible forest activities and reflect the diversity, quantity, quality, and capability of natural habitats on the forest[24]. Human-made or altered habitats may be necessary to support

[24] See sections in the plan related to terrestrial and aquatic habitats for additional descriptions of desired conditions for habitats.

populations in the short term, but in the long term, species are enhanced and/or returned to natural habitat.

2 Habitats for special status species support viable, self-sustaining populations. Ecological conditions provide habitat for federally listed and other special status species. Habitat conditions contribute to the survival and recovery of listed species, allow for repatriation of extirpated species, contribute to the delisting of species under the Endangered Species Act, preclude the need for listing new species, improve conditions for Southwestern Region sensitive species, and keep common native species common.

3 Habitat conditions provide the resiliency and redundancy necessary to maintain species diversity and metapopulations. Habitats have the soil characteristics and native vegetation to support the species that are dependent on them.

4 Streams and other aquatic systems have sufficient clean water, substrates, bank structure, and other features to provide high quality species habitat which benefits survival, growth, reproduction, and migration of associated native species. Properly functioning stream ecosystems provide habitat for native and desirable nonnative species and are resilient to disturbances.

5 Habitats throughout the Coconino NF include the microclimate or smaller scale elements needed for rare plants and animals. The structure and function of the PNVTs and associated microclimate or smaller scale elements (e.g., special features, rock piles, specific soil types, and wet areas) exist in adequate quantities to provide habitat and refugia for narrow endemics, species with restricted distributions, and Southwestern Region sensitive species.

6 Vegetation and stream connectivity provide for wildlife, fish, and plant species movements and genetic exchange consistent with landforms and topography. Species are able to access adjoining habitat, disperse, migrate, and meet their life history requirements.

7 Ephemeral and intermittent stream courses function as nesting habitat and movement corridors for species.

8 Human-caused physical barriers or habitat alterations (e.g., temperature changes, loss of streamflow) do not exclude species from their historic habitat or exclude them from using stream courses. Barriers to movement are located where necessary to protect native fish from nonnative species until watershed restoration allows connectivity to be restored.

9 Old-growth attributes such as multistory structure; large, old trees; large trees with sloughing, exfoliating bark; snags; large downed logs; and other indicators of decadence are present in all forest and woodland vegetation types, providing habitat for the associated species.

10 All age classes of deciduous trees (e.g., aspen, maple, Gambel oak) within the forest PNVTs are well represented and provide habitat for wildlife and rare plants.

11 The forest is known for high quality hunting and fishing opportunities. There is more emphasis, interest, and opportunity to fish for native sport fish. Nonnative sport fish and habitats are managed in locations and ways that do not pose substantial risk to native species.

12 Residents and visitors have ample opportunities to experience, appreciate, and learn about the forest's wildlife, fish, and plant resources.

Objectives for Wildlife, Fish, and Plants

FW-WFP-O

1 Implement at least 20 actions for federally listed species that contribute to recovery or implement recovery plan actions during each 10-year period of the life of the plan.

2 Implement at least 10 actions to benefit sensitive species that contribute to positive trends to avoid the need for listing during each 10-year period of the life of the plan.

3 Restore/enhance at least 60,000 acres of terrestrial wildlife habitat during each 10-year period of the life of the plan.

4 Restore/enhance at least 70 miles of stream habitat during each 10-year period of the life of the plan.

5 Complete at least 30 products or activities that educate the public about wildlife, fish, and plant resources during each 10-year period of the life of the plan. Examples of products include: educational signs and brochures, Web site pages, species checklists, presentations, and field trips.

Standards for Wildlife, Fish, and Plants

FW-WFP-S

1 Direction for species listed as threatened, endangered, proposed, or candidate takes precedence over direction for species not listed by the U.S. Fish and Wildlife Service.

Guidelines for Wildlife, Fish, and Plants

FW-WFP-G

1 Habitat management objectives and species protection measures from approved recovery plans should be applied to activities occurring within federally listed species habitat to promote recovery of the species.

2 To improve the status of species and prevent Federal listing, management activities should comply with species conservation agreements, assessments, and strategies.

3 Fire suppression techniques that minimize disturbance impacts should be used where there are listed and Southwestern Region sensitive species.

4 Seasonal timing restrictions should be applied for threatened, endangered, and sensitive species; bats; and Golden eagles to protect known nests, roosts, and other special features from habitat alteration and/or disturbance from management activities to avoid disruption of species or their habitats that could affect survival or successful reproduction.

5 To provide for northern goshawk nesting habitat, post-fledgling areas (PFAs), and nest areas should be designated. A minimum of six nest areas (known or replacement) should be located per territory. Goshawk nest and replacement nest areas should include known nests and generally be located in drainages, at the base of slopes, and on northerly (northwest to northeast) aspects. Nest areas should generally be 25 to 30 acres in size. In order to provide habitat while young goshawks are maturing, goshawk PFAs of approximately 420 acres in size should be designated surrounding the nest sites. Nest areas and surrounding PFAs should be delineated to include the best available goshawk habitat and generally comprise about 600 acres. PFAs generally have higher basal areas than non-PFAs.

6 Native species populations and habitats, including downstream habitats, should be maintained or improved by using measures that prevent degradation of habitat and the incidental or accidental introduction of disease or nonnative organisms.

7 Where native frogs and toads occur, established protocols should be followed to prevent the introduction and spread of a chytrid fungus (*Batrachochytrium dendrobatidis*) that kills amphibians.

8 Aquatic species should not be transferred through management activities from one 6th code watershed, except for reintroductions or introductions of native species into suitable habitat.

9 All equipment should be cleaned, inspected, and dried before leaving any water body to remove plants, fish, or animals so organisms and disease are not transported among water bodies.

10 Fences should be designed, modified, or removed to minimize impacts on wildlife movement. For example, road right-of-way fences should be located one-eighth of a mile from roads and lay-down fences and should be designed to minimize restriction to pronghorn movement.

11 Construction of additional fences should be minimal. Fence maintenance should be prioritized in threatened, endangered, and sensitive species habitat and important movement corridors and should occur as needed. Fences that are no longer needed should be removed.

12 The use of pesticides, herbicides, or any chemicals should be avoided near bat roosting, foraging, or watering areas to minimize contamination of bats or their prey. If application is necessary, apply techniques to minimize effects (e.g., small-sized spray blocks, application of buffers around roosts and riparian or aquatic habitats).

13 In order to minimize the potential reduction of rare plant populations through accidental collection, seed collection and cuttings should be the preferred collection methods when forest product and research collection permits are issued, unless it is determined that whole plant removal is required to meet the needs of the permittee and would not have the potential to impact rare plant populations[25].

14 Permits for cutting stalks off of agaves should not be issued, in order to protect stalks used as nesting and overwintering habitat for key pollinators of desert ecosystems such as carpenter bees. Exceptions may be made for limited research purposes.

15 Through discussions with American Indian tribes that collect plants for traditional cultural and ceremonial purposes, growth and regeneration of culturally important plants should be encouraged during forest restoration projects to promote their persistence.

Management Approaches for Wildlife, Fish, and Plants

Coordinate with the Arizona Game and Fish Department (AZGFD) regarding hunting recommendations to maintain and improve habitat elements such as vegetation and soil condition and productivity, particularly in montane meadows, riparian PNVTs, and aspen.

Coordinate with the AZGFD and U.S. Fish and Wildlife Service regarding listed and native species; reintroductions, introductions, or transplants of listed or native species; control or

[25] This guideline does not apply to pre-cleared areas for wilding permits of specific species.

eradication of nonnative species; and the management of sport and native fishes, including the identification of refugia for native fish.

Coordinate with the AZGFD, the U.S. Fish and Wildlife Service, sportsman groups, the scientific community—including the Rocky Mountain Research Station—and other stakeholders about information, education, and knowledge gaps as they relate to promoting and improving wildlife, fish, and plant resources and management. Education opportunities could include collaboration with research partners to provide student and volunteer participation in scientific studies.

Maintain the native-fish-only status of Fossil Creek and streams free of nonnatives through public education, signage, and law enforcement.

Refer to the plan implementation guidebooks for plants and invertebrates for project-level guidance. These two guidebooks are intended to be living documents that are periodically updated with new information (Stevens and Ledbetter, 2012; Hodgson and Waring, 2012).

Coordinate with Northern Arizona Native Seed Association partners and Colorado Plateau Native Plant Partners regarding native plant materials, research, and development.

Related Plan Content for Wildlife, Fish, and Plants

See the following: Aquatic Systems; Biophysical Features; Soil; Vegetation; Invasive Species; Tribal Relations and Uses; Roads and Facilities; Land Adjustments; Livestock Grazing; Special Uses; Recreation; Research Natural Areas and Botanical and Geological Areas

Invasive Species

General Description and Background for Invasive Species

Executive Order 13112 defines an invasive species as any species that is nonnative (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species generally possess one or more of the following characteristics: aggressive and difficult to manage; poisonous; toxic; parasitic; a carrier or host of serious insect or disease; and being nonnative, new, or not common to the U.S. or parts thereof. Invasive species pose an increasing threat to the integrity of ecosystems by decreasing native plant and animal diversity, increasing soil erosion and sedimentation, and interfering with natural fires regimes. Reducing the threat of aquatic and terrestrial invasive species will allow the Coconino NF to better manage resilient landscapes and species populations that have a greater capacity to survive natural disturbances and uncertain future environmental conditions such as those driven by climate change and increasing human uses.

Desired Conditions for Invasive Species

FW-Invas-DC

1 Invasive species are absent or exist at levels where they do not disrupt ecological functioning or affect the sustainability of native and desirable nonnative species. Invasive species include plants, animals, diseases, and insects. Examples include diffuse knapweed, bullfrogs, white pine blister rust, and the exotic spruce aphid.

2 Desirable nonnative species such as elk, where they exist, are not having negative impacts on native species.

Guidelines for Invasive Species

FW-Invas-G

1 Measures should be incorporated into project planning, implementation, and monitoring to prevent, control, contain, and eradicate priority infestations or populations of invasive species. Priority infestations or populations have the greatest threats to native species populations, watershed condition, ecosystem health, and biological diversity.

2 Integrated pest management approaches and other treatments to control invasive species should be used to improve watershed condition and maintain ecosystem function while minimizing project impacts on native species[26].

3 All equipment should be cleaned, disinfected, and inspected using current decontamination protocols to remove plants, fish, or animals so organisms are not transported among water bodies and healthy forest habitats and to maintain the integrity of native species populations and their habitats.

4 Weed-free plant material should be selected for all seeding and mulching projects to restore natural species composition and ecosystem function to the disturbed area. Plant or seed materials should be used that are appropriate to the site, capable of becoming established, and are not invasive.

5 Hay, straw, and mulch used for animal feed or bedding, applied control, soil stabilization and land rehabilitation, or other purposes by Forest Service personnel or their contractors should be certified as being weed free and weed-seed free by an authorized State department official or equivalent certification system to prevent unintentional introduction of invasive species.

Management Approaches for Invasive Species

Maintain a current inventory of invasive species on forest lands. For plant inventories, prioritize areas of unique and rare habitats first, and areas of high use and disturbance second (e.g., material pits, trailheads, campgrounds, corrals, roads, boat ramps, and bridges).

For control of invasive species, prioritize areas such as wilderness, research natural areas, botanical areas, wild and scenic areas, and riparian areas to maintain the integrity of native species and ecosystems. Promote early detection of new populations of invasive species and rapid management response as an effective approach to minimize spread.

Coordinate with stakeholders and educate the public to reduce, minimize, or eliminate the potential introduction, establishment, spread, and impact of nonnative invasive species.

Related Plan Content for Invasive Species

See the following: Aquatic Systems; Vegetation; Wildlife, Fish, and Plants

[26] See "Design Features, Best Management Practices, Required Protection Measures and Mitigation Measures" in the "Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds" (Forest Service, 2005) and the "Hygiene Protocol for Control of Disease and Aquatic Organism Transmission" (Forest Service, 2011a), or more current direction.

People and the Landscape

Fire Management

General Description and Background for Fire Management

Wildland fire is any non-structure fire that occurs in the wildlands. That includes either unplanned human-caused fires, naturally caused fires, or prescribed fires (i.e., planned ignitions).

Most of the vegetation on the forest is adapted to recurrent wildland fires started by lightning from spring and summer thunderstorms. Frequent, low-intensity and low-severity[27] fire plays a vital role in maintaining ecosystem health. Fire—both prescribed and wildfire—if properly managed, is a tool for restoring the forest's fire-adapted ecosystems.

Desired Conditions for Fire Management

FW-Fire-DC

1 Wildland fires burn within the range of intensity and frequency of the historic fire regime of the vegetation communities affected. High-severity fires rarely occur, except where this is part of the historical fire regime. See desired conditions for appropriate vegetation types.

2 Wildland fires do not result in the loss of life, property, or ecosystem function.

3 Wildland fires in the wildland-urban interface (WUI) are predominantly low intensity surface fires. Residents living within and adjacent to the forest are knowledgeable about wildfire protection of their homes and property, including providing for defensible space.

4 People understand that wildland fire is a necessary natural disturbance process integral to the sustainability of the forest's fire-adapted vegetation communities.

5 Public and firefighter safety are the highest priority in managing fire.

Guidelines for Fire Management

FW-Fire-G

1 WUI areas should be a high priority for fuels reduction and maintenance to reduce the fire hazard.

Management Approaches for Fire Management

Manage wildland fires forestwide for multiple resource management objectives[28] where conditions permit.

Integrate fire with other management tools to treat and restore fire-adapted ecosystems.

Coordinate with other jurisdictions such as communities, service providers (infrastructure), and Federal, State, county, and local entities regarding prevention, preparedness, planned activities,

[27] Low-severity fires refer to an area where a relatively uniform fuel type results in 0 to 25 percent top kill of vegetation when burned. See LANDFIRE Web site: www.landfire.gov/fireregime

[28] "Objectives" are used here in a general sense and do not refer to objectives that are plan components.

and responses to wildland fires. Notify the above regarding the upcoming and ongoing fire season and any prescribed fire activity.

Coordinate access for initial attack and suppression activities with responsible jurisdictions to reduce response times and address public and firefighter safety.

Encourage the development and implementation of community wildfire protection plans (CWPPs) to promote public safety and to reduce the risk of wildfire on non-Forest Service lands.

Related Plan Content for Fire Management

See the following: Air; Soil; Watersheds; Vegetation

Livestock Grazing

General Description for Livestock Grazing

Livestock grazing has occurred on the Coconino NF since the forest was established. This use has changed since the 1940s. During World War II and in the years following, there were substantially more livestock permitted to graze on the forest than there are today, and there were many more ranchers with permits on the forest.

Desired Conditions for Livestock Grazing

FW-Graz-DC

1 Rangelands provide large areas of unfragmented open space. These open spaces sustain biological diversity and ecological processes and help to preserve the rural landscape and cultural heritage of central and northern Arizona.

2 Domestic livestock grazing management maintains the desired composition, structure, and conditions of plant communities. Forage, browse, and cover needs of wildlife and authorized livestock should be managed in balance with available forage. Areas that are grazed have satisfactory soils, functional hydrology, and biotic integrity.

3 Livestock waters allow for safe access by wildlife. Troughs and uncovered storage tanks are designed or modified to avoid wildlife injuries.

Standards for Livestock Grazing

FW-Graz-S

1 Water developments shall incorporate escape devices to prevent animal entrapments.

Guidelines for Livestock Grazing

FW-Graz-G

1 To protect riparian area function, the placement of salt, minerals, and/or other supplements for the purposes of livestock management should be located further than a quarter of a mile from riparian areas or seasonally present water that is not overland flow.

2 New and existing water developments, corrals, and other handling or loading facilities should not adversely affect occupied sensitive plant habitat.

3 Livestock salting should be located away from sensitive resources, such as known locations of Southwestern Region sensitive plant species and archaeological sites, so these resources are not affected by associated trampling.

4 Burned or mechanically treated areas should be given sufficient rest, especially during the growing season, to ensure plant recovery and vigor and to ensure that perennial plants would not be permanently damaged by grazing. Characteristics such as the following should be present on a majority of the perennial plants within the treated area: seed heads or flowers, multiple leaves or branches, and/or a root system that does not allow them to be easily pulled from the ground[29].

5 Nonstructural and structural (e.g., fences, troughs, pipelines) range improvements should be used and/or located in a way that minimizes impacts to riparian functions, rare species, and archaeological sites, and should be relocated or modified when found incompatible.

6 New water developments, including stock tanks, should not be constructed in ephemeral or intermittent stream courses to avoid alteration of stream course hydrology.

7 Intensity, timing, duration, distribution, and frequency of livestock grazing should provide for growth, reproduction, and retention of adequate residual cover of desired plant species.

8 Efforts should be made to prevent transfer of disease from domestic sheep and goats to bighorn sheep wherever bighorn sheep occur.

9 Converting grazing allotments from cattle grazing to domestic sheep should not be considered within occupied bighorn sheep habitat to prevent the spread of disease between domestic and wild sheep populations. As opportunities arise, allotments near bighorn sheep habitat, where introductions, reintroductions, or transplants occur, should be considered for conversion from domestic sheep grazing to cattle grazing in cooperation with affected parties.

Management Approaches for Livestock Grazing

Collaborate with permittees, tribes, educational institutions, other agencies, and stakeholders in achieving and maintaining desired conditions, including invasive species management.

Regularly review active allotment management plans.

Leave gates in waterlot fencing open to wildlife except when controlling livestock distribution.

Consider establishing forage reserves to improve flexibility and balance between restoring fire-adapted ecosystems and range management.

Related Plan Content for Livestock Grazing

See the following: Soil; Wetland/Cienega and Reservoirs/Lakes; Springs; Vegetation; Wildlife, Fish, and Plants; Invasive Species

[29] These characteristics provide evidence of plant recovery, vigor, and reproductive ability.

Forest Products

General Description for Forest Products

National Forest System lands were reserved with the intent of providing goods and services to satisfy public needs over the long term. Among these goods is the production of a sustainable supply of forest products. The focus of the Forest Service has broadened over time, and the desired conditions for this plan are focused on outcomes rather than outputs.

Forest products fall into three categories: (1) timber, (2) special forest products, and (3) forest botanical products.

Timber products include, but are not limited to: firewood, wood pellets for home and industrial heating, structural panels, animal bedding, wood molding, pallets, structural lumber, posts and poles, sawtimber, pulpwood, non-sawlog materials removed in log form, cull logs, small roundwood, house logs, and biomass for electricity. Timber products can be measured in cubic or board feet of solid wood.

Special forest products include, but are not limited to: bark, berries, boughs, bryophytes (i.e., nonvascular plants), bulbs, burls (i.e., deformed tree growths), cactus, Christmas trees, cones, ferns, firewood, forbs, fungi (including mushrooms), grasses, mosses, nuts (including piñon nuts), pine straw, roots, sedges, seeds, transplants, tree sap, wildflowers, fence material, mine props, posts and poles, and rails. Special forest products do not include minerals, animals, animal parts, insects, worms, soil, and water.

Forest botanical products are a subset of special forest products but exclude timber products such as, but not limited to: Christmas trees, firewood, and fence materials. Forest botanical products include naturally occurring special forest products such as: bark, berries, boughs, bryophytes, bulbs, burls, cactus, cones, ferns, fungi (including mushrooms), forbs, grasses, mosses, nuts (including piñon nuts), pine straw, roots, sedges, seeds, shrubs, transplants, tree sap, and wildflowers. Like special forest products, forest botanical products do not include rocks, minerals, animals, animal parts, insects, worms, soil, or water.

Special forest products and forest botanical products do not have a common standard conversion to cubic or board feet of solid wood.

Desired Conditions for Forest Products

FW-FProd-DC

1 The forest provides a sustainable supply of forest products within the capacity of the land to produce these goods, consistent with vegetative desired conditions and within applicable laws and regulations.

2 Silvicultural treatments reflect natural disturbance regimes and contribute to ecosystem sustainability. Silvicultural timber cutting techniques are designed to integrate considerations for socioeconomic values, water quality, soils, wildlife habitat, recreation opportunities, visual quality, and other values, while providing opportunity for a sustainable and appropriately scaled industry.

3 Timber products are available to businesses and individuals in a manner that is consistent with other desired conditions and on a sustainable basis consistent with vegetative desired

conditions. Timber products are available to local American Indian tribes for subsistence and traditional purposes, such as kiva beams.

4 Collection of forest botanical products is authorized by permit and only when information is available to ensure the product will persist on the forest. Collection of plant species recognized as rare, limited in distribution, threatened, endangered, or sensitive is discouraged except for scientific and cultural purposes. Traditional tribal uses for forest botanical products, such as the collection of medicinal plants, wild plant foods, basketry materials, and firewood, are facilitated. Boughs and herbaceous plant parts used for American Indian traditional and ceremonial purposes are available under conditions and procedures that minimize restrictions and are consistent with laws, regulations, and agreements with tribes.

Guidelines for Forest Products

FW-FProd-G

1 Timber harvest activities should be carried out in a manner consistent with maintaining or making progress toward the desired conditions in this plan.

2 Harvesting systems should be selected based on their ability to meet desired conditions and not on their ability to provide the greatest dollar return.

3 On lands classified as not suited for timber production, timber harvesting should only be used for making progress toward desired conditions or for salvage, sanitation, public health or safety, or improving wildlife habitat or other resource values.

Management Approaches for Forest Products

Work with agencies, private organizations, and individuals to promote forest product use when forest products are available as a result of forest management activities.

Encourage use of forest products in lieu of onsite burning or chipping.

Ensure the continued sustainability of special forest products through observation of commercial sales and personal use permit harvest levels.

Recognize the rights of members of tribes whose aboriginal territories include the land now administered by the Coconino NF to collect forest materials for traditional, ceremonial, and subsistence purposes.

Encourage tribal members to engage in traditional activities relating to forest botanical products, such as the collection of medicinal plants, wild plant foods, basketry materials, and firewood for traditional and cultural purposes.

Related Plan Content for Forest Products

See the following: Ponderosa Pine; Wildlife, Fish, and Plants; Tribal Relations and Uses

Energy and Minerals

General Description for Energy and Minerals

Mining activity on the Coconino NF falls into three legal and regulatory categories: (1) locatable minerals such as hard rock minerals like manganese (which is subject to claim); (2) salable (permitted) mineral activities such as sand, gravel, and common building stone; and (3) leasable minerals which includes geothermal resources and oil and gas. The Forest Service's role in locatable mineral management is limited to overseeing rules and regulations applicable to surface resources. The Bureau of Land Management is the responsible authority for managing locatable minerals on public lands, including the national forests. Several areas across the forest have been withdrawn from mineral entry.

Desired Conditions for Energy and Minerals

FW-EngyMin-DC

1 Opportunities for environmentally sound minerals development are available. Important wildlife and plant habitats, visually sensitive areas, archaeological sites, and areas with large capital investments are protected through surface occupancy restrictions, mitigation measures, and operating plan requirements imposed on mineral activities. Adverse surface resource impacts are minimized through the appropriate administration of mineral laws and regulations. Past and present mine facilities are reclaimed to provide for public safety and minimize impacts to cultural and natural resources.

2 Use and development of mineral material sources occurs where needed for forest purposes such as road aggregate, fill, and riprap (i.e., large rocks used to armor road fills, streambanks, and bridge abutments). Mineral materials are available to State, county, and city agencies, where feasible, available, and consistent with other resource values.

Standards for Energy and Minerals

FW-EngyMin-S

1 Mineral operations and activities must avoid archaeological sites that have been determined to be eligible or may be eligible for the National Register of Historic Places.

Guidelines for Energy and Minerals

FW-EngyMin-G

1 To protect social, cultural, and ecological values and where management direction is not compatible with mineral development, the following areas should be considered for withdrawal for locatable minerals:

- Properties with a substantial Forest Service investment in facilities such as administrative sites and campgrounds.
- Traditional cultural properties where historic preservation laws alone do not adequately protect the cultural resource.
- Established research natural areas not located in wilderness.
- Geological and botanical areas.

- Habitat of species having a very limited range and specific habitat requirements not found elsewhere where law and regulation alone do not adequately protect the resource.

2 To protect social, cultural, and ecological values, the existing mineral withdrawal[30] on the San Francisco/Mount Elden Recreation Area and Oak Creek Canyon Recreational Area should be maintained.

3 To protect social, cultural, and ecological values, the following areas should be considered for no surface occupancy, no leasing, or other leasing stipulations for leasable minerals in:

- Designated and eligible wild and scenic rivers.
- Research natural areas not located in wilderness.
- The foreground of State and national scenic byways and national trails.
- Areas of very high scenic integrity not located in wilderness, wild and scenic rivers, or other withdrawals.
- San Francisco Peaks/Mount Elden Recreation Area withdrawal.
- Areas of very high archaeological site density (greater than 60 sites per square mile) and potentially eligible for the National Register of Historic Places.
- Areas with threatened, endangered, or sensitive species.
- Traditional cultural properties where historic preservation laws alone do not adequately protect the cultural resource.

Management Approaches for Energy and Minerals

Consider withdrawal from locatable minerals entry and operations for congressionally designated areas that are not specifically withdrawn by the legislation establishing them.

Existing mineral withdrawals should be recommended to the Department of the Interior for retentions, revocations, and modifications.

Incorporate BMPs and stipulations from the "Final Programmatic Geothermal Leasing Programmatic Environmental Impact Statement for Geothermal Leasing in the Western U.S." (Bureau of Land Management, 2008), or more current direction, into future leases as appropriate to the location.

Related Plan Content for Energy and Minerals

See the following: Special Uses

Heritage Resources

General Description for Heritage Resources[31]

The Coconino NF has some of the highest archaeological site densities in the Southwest, ranging from 1 to over 65 sites per square mile, with an average site density of 15 sites per square mile.

[30] Expires in year 2020.

[31] Heritage resources are buildings, sites, areas, architecture, memorials, and objects having scientific, prehistoric, historic, or social values.

About 30 percent of the forest has been archaeologically inventoried and approximately 10,000 archaeological sites have been recorded. They represent 12 prehistoric and 10 historic/modern cultural traditions ranging from the Clovis period of the Paleoindian tradition to historic and recent sites of the Hopi, Navajo, Basque, Mexican, and Euroamerican cultures.

One of the most important aspects of the forest's cultural sites is that most of the sites representing the prehistoric Sinagua tradition are contained within the forest. Sites of the prehistoric Cohonina tradition and the Archaic period are also quite abundant but are found outside of the forest as well. The most numerous site types are 1- to 2-room field houses and artifact scatters, followed by lithic scatters, historic sites, and pit house sites. Less common are petroglyph and pictograph sites, pueblos of 4 to 20 rooms, pueblos of 20 or more rooms, and agricultural sites.

About 2,700 sites have been determined to meet the criteria of eligibility for the National Register of Historic Places, meaning they: are considered culturally important because they are associated with important events or important people, are an outstanding example of a type of site or architecture, or have the potential to contribute important information to history or prehistory.

Sites of particular significance are formally nominated to be listed on the National Register, either as individual sites, a district, or as one of a number of significant examples of a class of sites. One hundred fifty-nine sites have been listed on the National Register, either individually or as part of six National Register districts.

Ten National Register sites on the forest have been determined of particular importance and were consequently designated as national historic landmarks. One of these sites is the C. Hart Merriam Base Camp and the other nine national historic landmark sites are within the Winona Village. Merriam's significant life zones concept was conceived in 1889 while he studied the different vegetation zones on the San Francisco Peaks. Winona Village is a complex of sites that was partially excavated in the 1930s, and it was the influence for many of the archaeological concepts for the prehistory of the Flagstaff area.

Several tribes, particularly the Hopi and Zuni, recognize many of the sites on the forest as ancestral villages, where many of the ceremonies and traditions of their cultures originated. Pilgrimages to some of these sites are still made, with offerings of prayers and other items.

The recreational, educational, cultural, and scientific values of the archaeological sites on the forest have been recognized as a recreational and scientific niche that the forest can provide to the public. Promoting and developing that niche, while respecting cultural and scientific values through research and conservation, is a goal of the heritage program of the Coconino NF.

Desired Conditions for Heritage Resources

FW-Hrtg-DC

Site Conservation and Evaluation

1 Historic and prehistoric sites, including known American Indian sacred places and traditional cultural properties, are preserved and protected for their cultural importance. They are generally free from adverse impacts or impacts are minimized through consultation with those tribes who are descendants of the prehistoric people who have used the area in historic times. Site integrity and stability is protected and maintained on sites that are

susceptible to imminent risks or threats, or where the values are rare or unique. Priority heritage assets, the forest's cultural resource "crown jewels," are all stable and their significant values are protected. Vandalism, looting, theft, and human-caused damage to heritage resources are rare. Site significance and integrity are maintained through conservation and preservation efforts and receive minimal impact from visitors.

2 Cultural and scientific values are continually enhanced through research and partnerships with tribes, universities, and museums. Through interpretation and public involvement in archaeological activities, appreciation and respect of cultural values and a sense of stewardship for our common heritage is increased.

Collections

3 Archaeological collections and associated records are curated at museums, organizations, and other institutions that meet professional standards for the purpose of scientific research, public education, and interpretation. Collection of additional items occurs when necessary to mitigate project impacts or for cases of scientific or educational value.

Enhancement and Interpretation

4 Heritage resources provide educational opportunities that connect people, past and present, to the land and its history. Through positive heritage experiences provided by interpretive sites, historic standing structures, and other materials, the public develops an appreciation for the region's history and develops an awareness of preservation efforts. In some cases, historic routes (e.g., railroad grades, General Crook Road, Beale Road) are used for recreation trails with interpretation of their history and some historic features. Heritage-based recreation opportunities are connected, where practical, with other recreation opportunities such as trails.

5 Public enjoyment is enhanced by opportunities to visit interpretive heritage resource sites. Archaeological site etiquette information is readily available to national forest visitors. Interpretation of the human history of the Coconino NF promotes greater public understanding of the communities that have depended on this landscape for their livelihood, recreation, and spiritual well-being and provides connections between prehistoric, historic, and modern people.

6 Opportunities exist for volunteers to participate in heritage resource conservation activities such as research, site stabilization, conservation, and interpretation. Heritage programs, interpretive presentations, or publications are available to provide the public with opportunities to learn about, understand, and experience the Coconino NF's prehistory and history.

7 Cultural resource findings are synthesized and shared with the scientific community and public through formal presentations, publications, and educational venues.

8 The forest's historic documents (e.g., photographs, maps, records) are available to the public for research and interpretation.

Objectives for Heritage Resources

FW-Hrtg-O

Site Conservation and Evaluation

1 Complete an analysis of at least 3 study units or site types every 10 years following plan approval to determine their rarity or ubiquity, potential significance for a range of archaeological questions, information gaps, and cultural values[32].

2 Non-project related archaeological surveys are conducted in areas of moderate to very high archaeological site density on 1,000 acres every 10 years during the life of the plan.

Guidelines for Heritage Resources

FW-Hrtg-G

Collections

1 Primary archaeological site and survey records should be maintained and updated on the forest. Associated records may be shared and maintained at institutions that meet professional standards (e.g., 36 CFR 79, American Museums Association accreditation) and have research interests on the Coconino NF.

Enhancement and Interpretation

2 To protect the cultural setting of the site and visitor experiences, commercial use of heritage-based interpretive sites should be limited to activities that enhance the public's understanding of the resource, protect and preserve the resource, and are consistent with tribal interests.

Management Approaches for Heritage Resources

Heritage program activities should maximize opportunities for partnerships and volunteerism in all program elements. Efforts should be made for cooperation with local, State, and private agencies and institutions in accomplishing program goals and objectives.

Site Conservation and Evaluation

Develop a prioritized list of sites that need stabilization or documentation in order to be preserved to maintain their information potential and significant values. Focus on sites at risk from vandals, natural conditions, and structural stability. Monitoring of sites is prioritized in high visitation areas such as near roads, campgrounds, and trails. Also prioritize sites for their ability to contribute to significant research issues at local, national, and international levels.

Divide the forest into archaeological study units (i.e., geographic areas that are meaningful units of analysis with which to examine and interpret the prehistory of that area) and site types (i.e., such as field houses, flaked stone scatters, small pueblos, large pueblos, pit house clusters, and rock art that have cohesiveness and can be studied as individual classes and/or can be compared between archaeological study units). When planning and implementing property class surveys,

[32] Understanding the scientific, cultural, and educational values of individual site types can provide a better basis for allocating them to management categories and for prioritizing them for scientific study, development, and preservation. See the first two management approaches for "Site Conservation and Evaluation" for more information on how to prioritize and conduct study unit and site type analysis.

give priority for identification and documentation to site types that are most subject to damage by expected project activities. Wooden structures and rock art, for example, can be more seriously damaged by fire-related activities than other site types.

Work with partners such as the Arizona Site Stewards program, Arizona Archaeological Society, National Park Service, and Museum of Northern Arizona to study, protect, and monitor sites.

Protect cultural and biological resources in the vicinity of Hartwell Canyon through partnerships and collaboration with organizations such as The Nature Conservancy and The Archaeological Conservancy.

Achieve a balance between activities that ensure historic resource management projects are in compliance with legal requirements to evaluate and protect archaeological sites (i.e., National Historic Preservation Act (NHPA) Section 106) and activities that focus solely on the cultural resources themselves (i.e., NHPA Section 110) by:

- Studying, documenting, and preserving sites; and
- Conducting a program of "public archaeology" to educate and inform people about heritage resources through site interpretation and hands on involvement in the archaeological process.

Site Stabilization

Site stabilization and restoration work should occur based on prioritization of the relative importance, information potential, tribal concerns, and uniqueness of a site. Monitoring should be conducted and documented after sites have been stabilized. Maintenance should be planned for and performed before it becomes critical[33] to the condition of a site.

Collections

Develop agreements with forest approved repositories to curate records and artifacts. Periodically inspect collections and repository facilities to ensure they continue to meet professional standards.

Leverage funding for analysis and curation of collected artifacts.

Retain physical records at Forest Services offices when they need to be accessed regularly for management and evaluation purposes. Maintain electronic records, including maps, letters, and other documents of historic importance. Maintain an annotated index of historic photographs and documents that briefly describes the image or content of each item.

Primary site records, survey records, photographs, and historic records should be scanned and indexed for use, with primary records receiving archival care. Protocols for accessing digital information, both informally and externally, should be developed. Provisions for curation of materials confiscated from Archaeological Resources Protection Act of 1979 prosecutions should be made as part of the deliberation process.

[33] Critical deferred maintenance is defined as a potential health or safety risk or imminent threat of loss of significant resource values (Forest Service Manual 2360.5).

Enhancement and Interpretation

Emphasis should be given for "self-discovery" developments to minimize the need for onsite staffing. Interpretation should include messages on individual responsibility to protect forest resources, with specific messages targeted to children. NHPA Section 110 survey and site stabilization requirements should be based on the findings of the archaeological site type planning studies and reflect current archaeological issues at local, national, and international levels. Tribal interests should be considered when planning interpretive projects.

Cooperate with private industry, museums, secondary schools, universities, organizations, and other Federal, State, and local governmental agencies to provide for heritage tourism that enhances the overall experience of visitors to the forest, results in preservation and protection of those resources, and is consistent with tribal interests and desires.

Encourage partnerships with American Indians, commercial ventures, volunteers, museums, and universities for documenting, preserving, interpreting, and managing sites and to evaluate and develop creative management opportunities.

Update the cultural resources overview as archaeological study units are defined and property classes are analyzed.

Partner with the Rocky Mountain Research Station on education opportunities, collection, and displays with respect to Fort Valley Experimental Forest, a site listed on the National Register of Historic Places.

Related Plan Content for Heritage Resources

See the following: Paleontological Resources, Tribal Relations and Uses; Roads and Facilities; Recreation

Tribal Relations and Uses

General Description and Background for Tribal Relations and Uses

American Indian tribes have lived for centuries on the land that is now the Coconino NF, and the forest recognizes and respects those relationships to the land. Some tribes consider the prehistoric sites to be the homes of their ancestors or recognize particular sites and places to be of historical, cultural, and religious significance. The Forest Service and federally recognized American Indian tribes have a special and unique government-to-government relationship (i.e., one sovereign nation to another) based on the U.S. Constitution, treaties, and statutes. The Coconino NF is adjacent to the Yavapai-Apache Nation near Camp Verde and is about 6 miles from the Navajo Nation Reservation boundary. The forest regularly consults with 13 American Indian tribes: Fort McDowell Yavapai Nation, Hopi Tribe, Hualapai Tribe, Havasupai Tribe, Navajo Nation, Pueblo of Acoma, Pueblo of Zuni, San Carlos Apache Tribe, San Juan Southern Paiute Tribe, Tonto Apache Tribe, Yavapai-Apache Nation, Yavapai-Prescott Tribe, and the White Mountain Apache Tribe.

Desired Conditions for Tribal Relations and Uses

FW-Trbl-DC

1 The Coconino NF recognizes American Indian needs and viewpoints and fosters a robust relationship with federally recognized American Indian tribes and related groups with which it consults. In addition to the official tribal government with which Federal agencies are required to consult, forest personnel also consult and talk with tribal historic preservation officials, traditional religious practitioners, tribal members, and other tribal organizations. The Coconino NF tribal consultation process notifies tribes about proposed activities on the forest that may be of interest, encourages face-to-face dialogue about proposed activities that are of interest, and provides information about how tribal input received during consultations is used in decisionmaking processes. The Coconino NF consultation processes and tribal interactions are compatible and consistent with its neighboring national forests.

2 Tribes work with the forest to identify traditional cultural properties so those areas can be protected from impacts by forest activities and public visitors, preserved, or restored for their cultural properties.

3 Tribal practitioners have access to areas that provide them an opportunity to practice traditional activities, such as plant gathering and ceremonial activities that are essential in maintaining their cultural identity and the continuity of their culture with reasonable limitations, consistent with public safety and multiple uses by other forest users. Forest products used by American Indians, organizations, and communities with ancestral or historic ties to the Coconino NF continue to be available for traditional practices. Collection of culturally important plants by American Indians does not negatively affect the presence and distribution of those species on the forest.

4 The forest provides a setting for the education of tribal youth in culture, history, and land stewardship and for the exchange of information between tribal elders and youth.

Management Approaches for Tribal Relations and Uses

Recognize the importance of a strong relationship with American Indian tribes and groups, and ensure Coconino NF personnel continuously cultivate those relationships. In addition, one person should be formally designated as a tribal relations coordinator to facilitate the tribal consultation process and maintain a record of tribal consultations.

Develop memoranda of agreement (MOA) between the forest and those consulting American Indian tribes with which a MOA does not currently exist to guide consultation processes and reflect the tribes' particular perspectives and interests.

Meet regularly with consulting tribes to better understand their needs and viewpoints.

Partner with consulting tribes in the management of cultural sites so that cultural resources are preserved and interpreted for the enjoyment of all visitors.

Work with the Kaibab National Forest and local tribes to develop a consistent forest products collection policy and tribal firewood program for use on both national forests.

Provide training to forest employees about the trust responsibilities Federal agencies have for tribes and the specific ways in which the Coconino NF honors and implements those responsibilities.

Continue to manage the land in a spirit of shared stewardship with the tribes.

Enhance tribal relationships and communications through volunteer opportunities with tribal members.

Related Plan Content for Tribal Relations and Uses

See the following: Alpine Tundra; Forest Products; Heritage Resources; Kachina Peaks Wilderness

Roads and Facilities

General Description and Background for Roads and Facilities

Roads

The road system provides access to private land, recreational opportunities, research sites, management activities and facilities that support resource management.

Facilities

The forest manages administrative facilities and sites for a variety of purposes, from office buildings and storage facilities to lookout towers and fire facilities. The forest uses administrative facilities and sites for the implementation and management of the natural resource.

Desired Conditions for Roads and Facilities

FW-RdsFac-DC

Roads

1 The transportation system (roads) expands and contracts commensurate with use and needs, and it balances the desire for public access with potential for ecological impacts. An economical system of sustainable, well maintained, and marked roads provides diverse opportunities to safely explore the forest and minimizes impact to watershed conditions, rare plants, fisheries, and wildlife habitat and movement.

2 Permanent and temporary roads systems minimize stream crossings. Bridges and culverts allow for safe passage for aquatic organisms.

3 Travel restrictions are clearly understood by forest visitors. Roads to private property provide reasonable access but do not necessarily provide for comfort or all-weather access. Roads that are under easement or special use permit are maintained to Forest Service standards by the permittee or easement holder.

4 Temporary roads that support ecosystem restoration activities, fuels management, or other short-term projects are rehabilitated promptly after project completion. Unneeded roads are closed and naturalized[34] to reduce human disturbance to wildlife and to reduce soil erosion.

[34] Naturalization may include decommissioning or obliterating system roads or rehabilitating user-created roads and trails.

Some closed roads are converted to motorized trails or nonmotorized trails for recreational use.

5 The minimum road system necessary for public, administrative, and private access is managed within designated municipal watersheds or areas that affect municipal water sources, such as the Inner Basin and Upper and Lower Lake Mary, in order to prevent impacts to water quantity and quality from sedimentation and runoff. Temporary increases in roads are appropriate for projects associated with watershed protection and restoration.

Facilities

6 Recreation sites, administrative buildings, dams, and other infrastructure operate as intended and provide a safe environment for people, while avoiding or minimizing negative impacts to natural resources. Energy efficient and economical facilities incorporate emerging technologies and are placed where they can be used effectively while making sustainable use of natural resources.

7 Forest facilities that are eligible for the National Register of Historic Places continue to be available for forest administration, public recreation and interpretation, tribal events, and other uses, unless prevented by concerns for health and safety. These sites retain their importance in American history through historic preservation and adaptive reuse and continue to contribute to the historical significance of the community.

Objectives for Roads and Facilities

FW-RdsFac-O

Roads

1 Naturalize or decommission 200 to 800 miles of unauthorized roads and system roads to create a more cost effective road system and to restore natural resources impacted by roads during the 10 years following plan approval.

Guidelines for Roads and Facilities

FW-RdsFac-G

Roads

1 To minimize disturbance to wildlife, road maintenance activities should avoid or minimize noise disturbance where disturbance sensitive threatened and endangered species are present.

2 Existing roads should be used or realigned before new roads are constructed in areas where disturbance sensitive threatened and endangered species are present. Where new roads are needed for projects that do not create a permanent facility or require long-term access, temporary roads should be used and rehabilitated or naturalized as soon as the project is completed to minimize impacts to natural resources.

3 The BMPs for watershed and water quality in road construction (e.g., the 2005 Draft FSH 2509.25 Non-Point Source Management or later versions) should be used to protect resources while constructing or relocating new and existing roads and to make decisions about their driving condition, location, or operational level. In particular, permanent and temporary road construction and relocation should:

- Occur outside of stream courses and identified streamside management zones, except to cross.
- Avoid wetlands, seasonally wet meadows, and montane meadows.
- Be minimized on soils that are unstable and highly erodible.

4 Stream crossings on permanent roads should be designed to provide the most cost efficient drainage structure consistent with resource protection, including safe passage of native aquatic organisms, and consider infrastructure needs and legal obligations.

5 To maintain an efficient and sustainable road system, unneeded roads should be decommissioned. Factors in prioritizing the naturalization of decommissioned and unauthorized roads should include the following:

- Watershed Condition
  - Soils that are receiving, or are expected to receive, damage to the extent that soil productivity is or will be significantly impaired outside of the road prism.
  - Riparian areas (e.g., springs, wetlands, or stream reaches) that are impaired due to sedimentation or alterations to hydrology related to the road.
  - Meadows at the TES montane meadows polygon map unit scale that are likely to be or being damaged.
  - Poorly located, designed, or maintained roads connected to downstream impaired waters, where potential for increased runoff and sedimentation is high.
- Wildlife, Fish, and Plants
  - Habitats for threatened, endangered, or sensitive species that are susceptible to roads as barriers or roads as mortality hazards.
- Social and Cultural Values
  - Areas of high or very high scenic integrity.
  - Roads that provide undesirable access to archaeological sites and areas of traditional cultural use by local tribal members.
  - Areas where user conflict must be resolved or to ensure public safety.
  - Semiprimitive nonmotorized ROS objectives as set through environmental analysis.
  - Roads where use levels or road maintenance causes adverse noise effects to wildlife during key periods in their life cycle or to recreational experiences.
  - Redundant roads.
  - Roads that are not identified on the motor vehicle use map (MVUM), which are not needed for administrative purposes.
  - Roads that continue to be used for public access despite motorized restrictions.

6 To reduce spread of invasive species, road closures or other appropriate methods to reduce dispersal should be used in areas that are a source for spreading plant and aquatic invasive species until the source of spread has been eliminated.

7 New roads, pullouts, and parking areas should be developed away from water courses and be designed to intercept surface-derived pollutants (e.g., oils, fuels, radiator fluid from vehicles), prioritizing protection of perennial water sources.

8 Roads deemed necessary should not follow water courses, and crossings should be as direct as possible to minimize erosion and sedimentation.

9 Roads should be located in other areas, realigned, or reconstructed to avoid accelerated soil erosion, loss of vegetation, and long-term impacts to soil productivity and soil condition such as compaction and the ability of the soil to infiltrate water outside of the road prism.

10 To facilitate navigation and improve enforcement, roads open on the motor vehicle use map or for administrative use should be signed.

11 Within inventoried roadless areas, roadless character should be maintained.

Facilities

12 The Forest Service's "Built Environment Image Guide" (Forest Service, 2001), or subsequent guides for facility design, should be used for public and commercial facilities on National Forest System lands in order to provide for consistency in design of facilities.

Management Approaches for Roads and Facilities

Roads

Cooperate with the National Park Service (NPS) to identify Forest Service roads near boundaries with national monuments that should be closed or decommissioned from the system to prevent trespass onto NPS land.

Consider wildlife and plant habitat needs early in the transportation and development planning process.

Work closely with the Arizona Game and Fish Department, Arizona Wildlife Linkages Working Group, Arizona Department of Transportation, and others to identify linkages and potential barriers to wildlife movement and to mitigate such threats during project design.

Take advantage of opportunities to work with the Federal Highways Administration to improve safe wildlife movement across interstate highways.

Encourage private landowners who use forest roads to take maintenance responsibility for roads that serve primarily private uses.

Collaborate with local and regional governments and transportation agencies to meet future local and regional transportation needs such as the design and location of roadway improvements and routes and alternative modes of transportation.

Facilities

Design narratives that provide criteria to determine the appropriate location, capacity, and type of facility required to meet user needs in the context of the forest setting.

Consult with archaeology staff on adaptive reuse and historic significance of structures that are older than 50 years. Reference the current facility master plan required by FSH 7300 to address

reuse and historical significance of structures. Consult the master plan for historical status, condition, and recommendation categories.

Evaluate outdated facilities and sites for current and future needs, potential reuse, and the ability to update or retrofit in order to meet the Agency's mission in an economical manner.

Native plants are protected to the extent possible by site design and mitigation measures during construction.

Related Plan Content for Roads and Facilities

See the following: Aquatic Systems; Soil; Wildlife, Fish, and Plants; Heritage Resources; Dispersed Recreation

Land Adjustments

See appendix A, map 13.

General Description for Land Adjustments

Land adjustments are the real estate transactions on the forest including sale, purchase, exchange, conveyance, and rights-of-way. Land exchange and land purchase have been, and will continue to be, the means by which the Coconino NF acquires key wildland resources and open space areas.

Desired Conditions for Land Adjustments

FW-LndAdj-DC

1 The Coconino NF has a mostly contiguous land base that provides for biologically diverse public lands with minimal impacts from adjacent land uses. Most of the forest has a natural-appearing landscape that has not lost its wildland character. Open space values are retained, including those related to naturally appearing landscapes, wildlife habitat, riparian/wetland character, and recreational opportunities.

2 Easement rights-of-way help provide adequate access to the forest. Appropriate trail access through private lands is identified and managed or acquired through the private land development process, in cooperation with local governments. Reasonable access is provided to private inholdings.

Guidelines for Land Adjustments

FW-LndAdj-G

1 To better promote the mission of the Agency, lands that the forest considers for acquisition should have one or more of the following qualities:

- Contains habitat for threatened or endangered species and sensitive species.
- Contributes to the continuity of wildlife and plant habitat.
- Contains or influences wetlands, riparian areas, or other water-related features
- Provides needed access, protects public lands from fire or encroachment, or prevents damage to resources.

- Contributes to areas of high or very high scenic integrity.
- Improves the ability to manage a designated special area.
- Contains significant sites with cultural, scientific, or recreational values.

2 To retain the forest's setting and contribution, lands that the forest is willing to exchange or sell should have one or more of the following qualities:

- Isolated from other NFS lands.
- Without unique cultural, scientific, or ecological resources.
- Managed for a single commercial or other special use, for which it is being exchanged or sold.
- Has lost its wildland characteristics.
- Lands needed to meet the needs of communities and the public such as land for a water treatment plant.

3 When responding to requests for new access permits or easements, easements should be granted in reciprocity to ensure administrative and public access to the forest unless they are inappropriate because of the physical situation of the site or because they would conflict with the areas desired conditions.

Management Approaches for Land Adjustments

Consult with local governments about land adjustment proposals the forest plans to take forward into the NEPA process. Public input on land exchange begins at the time a site-specific land exchange is proposed.

If acquisition cannot occur, collaborate with private landowners and county governments in the land development process to protect unique resources such as scenery, adjacent wilderness, archaeological values, and threatened and endangered species habitat. Encourage local governments or agencies, private landowners, and/or other appropriate entities (e.g., The Nature Conservancy, Trust for Public Land, Archaeological Conservancy, and local land trusts) to protect the resources and character of the national forest through methods such as conservation easements, land trust management, deed restrictions, or public acquisition of adjacent, high-priority parcels.

Work with landowners and local and regional governments to encourage policies and development practices that conserve open space, reduce wildfire risk, and retain ecosystem benefits. Provide input to the design requirement of new developments (especially when they are adjacent to the forest) and participate in community growth planning efforts. Participate as a government liaison concerning open space issues. Continue linking city and county trails to Forest Service trails. Share public outreach and education tools and information about future plans.

Support open space designations adjacent to the forest to minimize conflicts between residents and other forest users. Review and participate in local government plans to encourage open space objectives that are consistent with national forest management direction and policies.

Work with local and regional governments and road agencies to develop transportation solutions that reduce traffic and vehicle impacts on national forest lands.

Work with homeowner associations and homeowners in the Flagstaff and Sedona Neighborwoods Management Areas to plan and implement measures that reduce wildfire threats to life and property such as:

- Providing reasonable road ingress and egress for emergency evacuation of personnel.
- Providing reasonable road access suitable for use by fire engines, including places to turn engines around.

Related Plan Content for Land Adjustments

See the following: Scenic Resources; Flagstaff Neighborwoods Management Area; Sedona Neighborwoods Management Area

Special Uses

General Description for Special Uses

Land Special Uses

Special use permits authorize a large variety of activities on the national forest. Lands special uses are not related to recreation special uses and may include activities such as utility lines, road use, communication sites, research, and wind energy development. Utility and energy transmission corridors, along with communication sites, are generally long-term commitments of NFS lands. Increased demand is expected for utility lines; renewable energy sources; community infrastructure; private land access; and local, State, and Federal public transportation systems to serve the growing populations of Arizona and the Southwest.

Recreation Special Uses

Recreation special use permits authorize services that support the Forest Service mission and meet the needs of the public. These permits are a partnership between the Forest Service and private businesses and individuals to provide services and facilities such as outfitter-guide services, skiing, and special events.

Desired Conditions for Special Uses

FW-SpecUse-DC

Land Special Uses

1 Infrastructure on national forest lands associated with private land needs (e.g., utilities, water lines, roads, and bridges) meets scenic goals, particularly as viewed from the highways, concern level 1 travelways, and recreation sites. New utility construction and reconstruction of existing utility lines uses existing rights-of-way to the extent practical to provide utility access and services to private land and communities. Rights-of-way and authorization for road construction occur at locations and with plans and specifications that effectively protect national forest and other affected ownerships' lands and resources.

2 Utility lines, such as pipelines, power lines, fiber optic lines, and telephone lines, are buried unless there are overriding environmental or technical concerns that would prevent burial. Vegetative clearing for utility and energy transmission corridors provide an aesthetic edge effect. The location of new, large linear infrastructure such as power lines has minimal effects to wildlife and minimizes habitat fragmentation.

3 Existing communication sites and utility corridors are used to their maximum capacity with compatible utilities where additions are environmentally and visually acceptable before considering new routes and sites. New corridors avoid research natural areas, geological and botanical areas, and environmental study areas. New communication sites occur only when a broad public need is demonstrated. Power lines and towers are built (construction or reconstruction) to specifications compatible with raptor use.

4 Information about the screening process for special use permits is available and understandable to the public.

5 The forest supports alternative energy production and facilitates its development while mitigating impacts to resources and public values. Alternative energy developments, such as wind energy, are designed to minimize impacts to other uses and resources, in particular wildlife and scenic integrity.

6 Research permitted on the national forest is focused on improving the scientific understanding of natural and social systems. Research projects conducted under special use permits:

- Help realize and understand the scientific potential of the abundant cultural and natural resources found on the Coconino NF.
- Are clearly related to the mission of the Forest Service.
- Provide needed data or other resources for future forest management.
- Expand the knowledge of rare species on the forest.

Recreation Special Uses

7 Special use activities blend into the landscape and do not draw attention to the activity or equipment. Commercial tours are focused on main roadways and vistas as well as selected recreation locations. They support the Forest Service mission by providing high quality outdoor recreational, educational, and interpretive opportunities. If the need can be demonstrated, commercial tours are allowed to provide opportunities for scenic viewing, natural history education, wildlife viewing, and other activities that are compatible with resource protection, user experiences, and forest direction.

8 Commercial and recreational activities are consistent with other direction for the location including Recreation Opportunity Spectrum (ROS) objectives, resource protection, and community goals.

9 Livestock used in special use activities does not negatively impact areas where forage is limited.

10 Outfitter/guide permits or permit use does not cause a significant change for the ROS social or managerial setting such as allowing airboats or seaplanes on lakes that are at a less developed ROS setting. Motor vehicle use for outfitter-guide activities occurs on roads and trails displayed on the motor vehicle use map or on roads specifically authorized under their permit.

11 Large group gatherings and recreation event sites provide a range of opportunities from a natural, “outdoor” experience to commercial amenities for visitor comfort. These pre-analyzed sites are generally areas that are compatible with use by the general public and are identified based on their ability to support large group activities with minimal resource

impacts. They do not have long-term evidence of erosion or invasive species as a result of special use activities. In general, events occur where they will not disrupt the general public's use of the land.

12 Recreation residences and commercial facilities on the forest meet State and county health and safety standards. Their footprints are stable with some exceptions to accommodate improvements that address health, safety, and environmental issues. Organization camps managed under special use permits are focused on natural resource values, conservation education, and emphasize nonmotorized recreation opportunities.

Objectives for Special Uses

FW-SpecUse-O

Recreation Special Uses

1 Identify 4 preapproved sites for recreation events and large group gatherings within 10 years of plan approval.

Standards for Special Uses

FW-SpecUse-S

Recreation Special Uses

1 Prohibit motorized aircraft landings and takeoffs associated with outfitter-guide activities on National Forest System lands and waters, except for emergencies and rare administrative support activities.

2 Require permit holders to rehabilitate user-created trails and other impacted areas created by their activities that were not authorized under their special use permit.

Guidelines for Special Uses

FW-SpecUse-G

Land Special Uses

1 In accordance with scenery desired conditions and landscape character, utility rights-of-way should be located and maintained to conform with natural-appearing patterns of native vegetation.

2 New overhead utility lines and support towers should be located to minimize adverse ecological and scenic impacts through screening and other mitigations.

3 Structures, such as communication sites and utilities, should be designed to reduce contrast with the desired landscape character in accordance with scenic integrity objectives.

4 Equipment of a comparable scale should be allowed for expansion of existing utility corridors before creating new sites or corridors in order to minimize scenic and ecological impacts.

5 To minimize the proliferation of roads on the forest while meeting legal obligations to owners of inholdings, only one access road should be approved to a parcel of private property whether there are one or many owners.

6 To optimize use of existing sites and minimize negative scenic and ecological impacts, expansion of existing communications sites as allowed by existing or updated communication site plans should be considered before creating new sites. The number of towers should be minimized by approving designs capable of colocating multiple communication carriers/services.

7 Where environmental or technical concerns prevent the burial of utility lines, scenic integrity objectives should be maintained through appropriate site and design mitigation for aboveground lines.

8 Aircraft activities related to commercial filming should be restricted to protect threatened, endangered, and sensitive species from noise disturbance.

9 Diversion ditches permitted across NFS lands should be maintained in a way that minimizes disturbance of vegetation and hydrological conditions.

10 To prevent publicizing the location of cultural sites, commercial filming at cultural sites should be prohibited.

11 Research projects should:

- Not interfere with recreation opportunities for the general public.
- Not introduce new invasive plants or animals.
- Not negatively impact long-term vegetation structure and composition or vegetation management objectives for the vegetation type.
- Be colocated with other research activities, when possible.

Recreation Special Uses

12 In order to maintain the recreation setting, outfitter/guide use, when combined with unguided use, should not exceed encounter levels as described in the designated ROS class. Where higher encounter levels are determined to be reasonable, an ROS class inconsistency or exemption is described in the plan (list of exemptions are found under "Sedona/Oak Creek Management Area," "Desired Conditions," "Dispersed Recreation").

13 Outfitter-guide motor vehicle use and camping activities should be excluded from areas with sensitive resource issues, such as a high density of archaeological sites, sensitive wildlife areas (including riparian areas or areas with sensitive or rare plants), and adjacent to urban areas, in order to prevent compaction of soils and overutilization of popular areas.

14 To protect riparian vegetation, special use permits should generally not be given for activities proposed to occur within 200 feet of perennial streams, springs, or sensitive waters. Exceptions will be for hardened or slickrock sites or for activities in support of approved research, to improve safety, or to provide for site rehabilitation.

15 Commercial and recreational activities should occur during times and in locations that are consistent with the needs of national forest users and area residents.

16 Commercial use travel should be limited to roads and trails on the motor vehicle use map, or to sites designated in an operating plan for such use. Exceptions include activities that require very limited access over a short period of time, such as hot air balloon retrieval and similar activities, where this access is specified in the permit.

17 Commercial uses should use non-National Forest System lands for their activities when their proposed use is not consistent with national forest goals and can be accommodated on non-National Forest System lands.

18 Large group gatherings and recreation events should occur in areas that have already been analyzed for resource issues or suitably developed sites, unless such sites have not yet been identified on a district. Applicants are encouraged to use non-National Forest System land for staging when possible.

19 Commercial tours at high interest archaeological sites—such as Honanki—should be consistent with site protection and visitor experience objectives.

20 Air tour companies and rock climbing activities should not disturb occupied eyries between March 1 and August 31, to protect the area during the peregrine falcon breeding season and to protect other raptor species sensitive to noise disturbance.

21 Additional outfitter/guide activities or group activities should generally not occur in Deadman Wash, Dry Lake Hills, Walnut Canyon from Fisher Point east, and Pumphouse Wash except to improve safety or protect natural resources.

22 Special use events should occur on Snowbowl Road infrequently and should not interfere with use of the area by the general public or permittees near the Snowbowl Ski Area in order to preserve public access to the mountain and facilities.

23 Where forage is limited, overnight campers with recreational livestock should carry cubed, pelleted, or rolled feed to prevent overgrazing of camping areas. Feeds should be free of viable noxious weed seeds to prevent introduction of noxious plants.

24 Sites preapproved for special use activities should be rated/designed to accommodate a specific number of people in order to provide for resource protection and prevent overutilization.

Management Approaches for Special Uses

Land Special Uses

Encourage proponents to involve the forest early in the special use permit proposal development process.

Work to ensure that all communication sites have a communication site plan in place.

Consider management area specific scenery desired conditions, when determining whether a permit would be consistent with the scenic integrity objectives. For instance, astronomical facilities in the Pine Belt and Anderson Mesa Management Areas would be permitted given the desired conditions for these management areas.

Consider processing right-of-way grants by priority; first priority being the public interest and national forest needs.

Collaborate with the Rocky Mountain Research Station in assessing research needs, opportunities, and methods relevant to current and future forest management.

Coordinate with the research community to identify and manage long-term research locations with the intent of balancing research and management needs.

Recreation Special Uses

Priority is given to permit applications received in response to a prospectus issued by the Forest Service. Unsolicited proposals will be evaluated on a case-by-case basis as workload allows.

Outfitter-guide and recreation event permits may be prevented in areas with heavy recreation use by the general public until an appropriate determination of need and capacity is completed.

Develop a forestwide or districtwide management plan for administering special use permits, as appropriate.

Before permitting outfitter-guides in areas adjacent to national monuments, contact the National Park Service (NPS) for coordination. Outfitter guiding might also help meet the mission of the NPS in the national monuments or on adjacent national forest lands. Work cooperatively with the NPS for special use requests that occur on both Forest Service and NPS lands.

Coordinate wildlife viewing permits with the Arizona Game and Fish Department.

Related Plan Content for Special Uses

See the following: Wildlife, Fish, and Plants; Energy and Minerals; Roads and Facilities; Recreation; Scenic Resources

Recreation

General Description for Recreation

Coconino NF provides public access to central Arizona settings that accommodate a wide range of opportunities for outdoor, nature-based recreation. Interstates 40 and 17 connect the Coconino NF with several urban populations including Phoenix, Tucson, Flagstaff, Las Vegas, and Albuquerque. Smaller rural towns and communities utilize parts of the Coconino NF as local recreation areas and tourism attractions. Scenic rivers, creeks, and lakes create unique mountain settings for water-based activities such as fishing, swimming, and motor boating. Several rivers have sections of whitewater for kayaking, canoeing, and rafting. Remote back-country areas of the forest accommodate dispersed recreation activities like backpacking, mountain biking, horseback riding, and hunting.

Desired Conditions for Recreation

FW-Rec-DC

1 Recreation programs, infrastructure, and services are useable by all people to the greatest extent possible without separate or segregated access for people with disabilities. Information on what conditions recreation visitors will encounter on trails is well advertised at the trailhead. Trails and facilities incorporate principles of universal design.

Dispersed Recreation

See appendix A, maps 2, 3, 14, and 17.

General Description for Dispersed Recreation

Dispersed recreation consists of activities that take place outside of developed camping or concessionaire-operated facilities. This may include dispersed camping in designated sites or corridors that lack substantial improvements. The types of uses considered dispersed recreation generally include: hiking, camping, horseback riding, mountain biking, rock climbing, geo-caching, and motorized vehicle recreation. Some of these activities can also occur in developed camping or concessionaire-operated facilities but this section of the plan only refers to their occurrence in less improved settings.

Desired Conditions for Dispersed Recreation

FW-Rec-Disp-DC

1 The diverse landscapes of the Coconino NF offer a variety of settings for a broad range of recreational opportunities in all seasons and a place for visitors to escape into natural, wild places. Landscapes range from primitive settings that provide opportunities for solitude, to more developed, rustic settings that provide opportunities for social interaction and greater human comforts such as sources of drinking water, trash disposal, and boat docks at lakes. Recreation opportunities exist for people with a variety of abilities. As development and population in the region continue to grow and new forms of recreation emerge, recreation settings on the Coconino NF are stable, retaining their natural character. Loss of remote, undeveloped settings does not occur in semiprimitive and primitive settings. Recreation activities are balanced with the ability of the land to support them and create minimal user conflicts. The Coconino NF fulfills a unique and vital role as a place of learning and caring about the environment.

2 Growing demand for recreation is balanced with other forest desired conditions, unless increasing capacity results in unacceptable negative effects on natural resources. Managed recreation use stays within this capacity with the exception of holiday weekend use levels that may exceed capacity on a short-term basis so long as resources can recover from short-term increases in use. Recreation on the Coconino NF enhances the quality of life for residents and provides tourist destinations, which contribute to local economies.

3 Dispersed recreation activities on the Coconino NF include driving, hiking, wildlife viewing, hunting, fishing, horseback riding, camping, and hunting, among others. Recreation activities do not significantly detract from the natural character of the forest; impact resources such as aesthetics, soils, vegetation, and wildlife; or contribute to user conflicts. Non-recreation activities that take place have minimal effect on recreation activities. For example, thinning projects do not result in slash piles that block trails, and projects that temporarily impact trails are followed up with trail restoration.

Motorized Recreation

4 Motor vehicle use is a legitimate use of National Forest System lands. Motorized vehicle use only occurs as identified on the motor vehicle use map (MVUM), except as authorized by permit or for administrative uses. A motorized trail system provides a variety of trail widths and levels of challenge for a diversity of users. This system offers opportunities to enjoy scenery, wildlife viewing, a variety of terrain and conditions, and dispersed camping. Multi-use trails are more common than those available for only one class of vehicle and may interconnect with roads to make loops. Motorized routes are easily identified on the ground and on the motor vehicle use map. Single-track motorized vehicle trails emphasize solitude

from wider types of motorized vehicles and challenge to the extent practical. Motorized trail opportunities provide long distance connections between motorized recreation hubs.

5 The boundaries of the Cinder Hills Off-Highway Vehicle (OHV) Area are clearly delineated and prevent off-road driving outside of the designated area. Intrusion on Sunset Crater National Monument is eliminated. Clear signage and information are provided to off-highway vehicle drivers to make clear distinction between driving rules in the Cinder Hills OHV area and rules that apply to the cinder cones outside of the OHV area. Connectors provide access to the motorized trails within this area from a number of nearby access points and adjacent motorized trails.

6 Adequate signage is provided to advise the public of where motorized vehicles are permitted. Information kiosks are located at main entryways onto the forest with pertinent motorized recreation information. Information is provided for OHV recreationists and trail users, including maps and signs that provide road and trail information and explain national forest regulations for such activities as OHV travel and camping and trail opportunities. Orientation information and interpretation is provided at sites that receive high levels of visitation.

7 Resource damage from unauthorized motorized trails is minimal and unauthorized trails are rehabilitated to prevent future access by the public and to mitigate long term soil and water impacts. Motorized trails are located with minimal impact to sensitive resources such as cultural sites, highly erodible soils, water, and wildlife and botanical resources. Poorly located trails are redesigned or relocated.

Interpretation and Education

8 Forest Service communication and interpretive messages show respect for the diverse backgrounds and needs of visitors. The Forest Service communicates accurately and conveys a land ethic to visitors. Visitors are well informed and interpretation emphasizes a land ethic that explains how to reduce their impacts on ecosystems and support the Coconino NF's efforts to protect natural resources and wilderness values. Low impact recreation principles are promoted and widely practiced by the visiting public. There is little human litter as a result of effective enforcement, patrols, and use of refuse and recycling facilities. Through a variety of interpretive efforts, people learn about geology, botanical communities, biodiversity, and heritage site etiquette, and they will be motivated to practice careful stewardship.

9 Information kiosks minimize visual clutter by concentrating messages and eliminating the need for multiple signs. Coconino NF information boards provide regional recreation maps and information, site-specific interpretation, trip preparedness, ethics, and seasonal information or closures.

10 Interpretation and communication results in residents adjacent to national forest lands understanding the natural environment and cultural resources and are partners in managing the neighboring forest lands for public use and resource protection.

11 The national forest educational mission underlies all resources, including vegetation management, rare plant communities, fire, wildlife, fisheries, and heritage resources. Through an increased effort to provide learning-based recreation, the Coconino NF provides strong local and regional support as sustainable nature-based tourism continues to grow into the 21st century.

Camping

12 Forestwide, dispersed recreation sites have minimal evidence of human waste and litter and resource damage. Where resource damage has occurred in high traffic locations, sites are rehabilitated to discourage expansion of the impacts.

13 Dispersed camping with recreational vehicles and campers occurs in designated motorized camping corridors or designated spur roads as shown on the motor vehicle use map. There is a range of choices available for dispersed camping. Most motorized dispersed camping areas are not overcrowded, and their naturalness is maintained. In both nonmotorized and motorized dispersed camping areas, trees are intact, and soil erosion, impacts to understory vegetation, and evidence of human waste are minimal. Invasive plants and animals are not introduced or spread by activities.

Trails and Trailheads

14 A system of well-marked and well-maintained trails provides opportunities for visitors to explore the forest. Access roads to trailheads are open and maintained, and trailheads provide adequate parking and vehicle turnaround space. Trailheads minimize conflict with private land and avoid impacts to ecological and cultural resources. Trails provide access to scenic and wildlife viewing opportunities. Trailheads and trails are designed to be sustainable; erosion is well controlled and, therefore, maintenance needs are minimized. Damage to resources from trailheads and trails is minimal and within the ability of the forest to mitigate or restore. Trail level of development is appropriate to the site conditions and ROS setting. Trail use remains on the established tread, especially in high traffic or sensitive areas such as the Verde Valley Botanical Area.

15 Meadows and riparian areas are visually appealing and free from evidence of physical, mechanical, or vegetative damage due to recreation and other forest activities. Physical impacts to meadows and riparian areas are confined to specified road crossings, trail crossings, and access points. These structures are designed to minimize damage to meadows and riparian areas.

16 Historic trails, such as Beale Wagon Road, Chavez Road, and logging railroad grades, are preserved and adapted for contemporary use. National Forest System trails adjacent to urban areas sometimes connect to urban trail systems to expand the recreation opportunity. Markers on winter sports trails are visible in winter. Mountain biking occurs on multiuse trails which provide adequate opportunities for different levels of skills and a variety of settings.

17 Unplanned social trails are rare and off trail nonmotorized use is discouraged in ecologically sensitive and high traffic areas. Trails in areas with resource concerns, such as sensitive soils that may result in accelerated erosion and loss of soil productivity, rare plant or riparian impacts, or where high user conflicts occur, are prioritized for closure, rehabilitation, and mitigation. Recreation uses, including some mountain biking trails that provide a high level of challenge, are located where their impact to soil and vegetation resources is minimized.

18 Trailheads are easily accessible and do not interrupt the traffic flow along main roads. Infrastructure at trailheads is durable, sustainable, and appropriate for the setting. Boundaries of trailhead parking areas are clearly defined to prevent parking outside of the trailhead. Trailhead interpretive information is appropriate for the uses of the trail and provides information on low impact trail use. The level of development at trailheads is

appropriate for the ROS setting[35]. Trailheads that are needed for multiseason recreation access are designed to accommodate snow removal. Ample access to year-round recreation activity areas is available. Trailheads intended to accommodate horse trailers are wide enough for vehicles with trailers to turn around and have a firm, stable surface to prevent resource damage in wet conditions.

Water-Based Recreation

19 Recreation opportunities at waterways and lakes emphasize day-use, nature-based activities such as hiking, picnicking, wildlife viewing, photography, boating, swimming, fishing, and interpretation. These activities in and near riparian areas do not contribute to bank erosion, trash, water quality, or sanitation issues. Camping is discouraged where recreation activities have damaged riparian, shoreline, or aquatic resources. Angling opportunities are available at remote sites, with a semiprimitive or primitive character and in a natural setting.

Snow-Based Recreation

20 Snowplay activities occur where conflict between motorized and nonmotorized activities is mitigated through signage and design considerations.

Wildlife-Based Recreation

21 The Coconino NF provides for a diverse range of hunting, fishing, and wildlife viewing opportunities. Blinds, stands, cameras, and other structures brought in by the public are temporary and portable and do not have long-term effects on vegetation and wildlife. Quiet areas[36] provide opportunities for nonmotorized hunting experiences with minimal disturbance of wildlife. Wildlife viewing takes place in natural areas without disturbance to wildlife.

Objectives for Dispersed Recreation

FW-Rec-Disp-O

1 Develop 2 to 8 systems of designated bike trails, equestrian trails, and/or motorized trails to adequately provide for these user groups and reduce conflicts between user groups within 10 years of plan approval.

Standards for Dispersed Recreation

FW-Rec-Disp-S

1 Prohibit motor vehicle use beyond the designated system of roads, trails, and areas, as defined on motor vehicle use maps, except for those uses authorized by law, permits, and orders in connection with resource management and public safety.

[35] For example, an area that is providing access into a semiprimitive nonmotorized or primitive setting uses natural materials for the parking area and has signing that is minimal but provides adequate information for the recreation experience. Trailheads in more developed settings may have constructed fencing, gravel or pavement, and other developed features more consistent with developed campgrounds and picnic areas as appropriate under the ROS objectives for that level.

[36] Quiet areas are areas closed to motor vehicle traffic seasonally to provide for a nonmotorized hunting experience. These areas have existed since the 1987 plan was instated. They are designated by the Forest Service and Arizona Game and Fish Department jointly (See "Dispersed Recreation Standards" for closure periods).

2 Motorized vehicle use shall be restricted in the following areas[37] during the specified seasons of the year[38]:

- Nordic Ski Center Seasonal Closure – closed to motor vehicle use from December 1 to March 31.
- Wing Mountain Cross Country Ski Area Seasonal Closure – closed to motor vehicle use from December 1 to March 31.
- Pine Grove Seasonal Closure – closed to motor vehicle use from August 15 to December 31. Roads within the area are closed, but the roads along the perimeter are open to motorized travel. The purpose of the closure is to provide opportunities for recreation in areas undisturbed by vehicles.
- Rattlesnake Seasonal Closure – closed to motor vehicle use from August 15 to December 31. Roads within the area are closed, but the roads along the perimeter are open to motorized travel. The purpose of the closure is to provide opportunities for recreation in areas undisturbed by vehicles.
- Woods Seasonal Closure – closed to motor vehicle use from December 15 to April 1. Roads within the area are closed, but the roads along the perimeter are open to motorized travel. Schnebly Hill Road and Forest Road 153 are not affected by this closure. The purpose of the closure is to minimize disturbance to big game winter habitat.

3 Horse and pack stock[39], except for limited administrative use, are not allowed on these trails:

- Elden Lookout Trail;
- Oldham Trail, the portion between Buffalo Park and the El Paso natural gas pipeline;
- Humphreys Trail and Weatherford Trail above Doyle Saddle;
- Fay, Wilson Mountain, West Fork of Oak Creek, and Devil's Bridge;
- Boynton Canyon Trails within Red Rock-Secret Mountain Wilderness; and
- Inner Basin Trail above the watershed cabin.

Guidelines for Dispersed Recreation

FW-Rec-Disp-G

1 Trails should be built, rerouted, or maintained utilizing current best practices to promote sustainable treads while meeting desired user experiences.

2 Trail access to springs should be limited to minimize erosion, trampling, compaction, and inadvertent introduction of invasive and undesirable plants, animals, and disease while still allowing access by wildlife.

3 On trails that provide for horseback riding opportunities, equestrian friendly gates should be

[37] These seasonal closures were carried forward from the 1987 plan (revised May 1991), and they are identified on map 3 in appendix A.

[38] These closures are incorporated into the MVUM and associated closure orders. Other closures may not be reflected if they are authorized by separate NEPA and/or are temporary.

[39] This standard is carried forward as-is from the 1987 plan. See Watersheds and Wildlife, Fish, and Plants for associated desired conditions.

used instead of barbed wire pass-through areas to allow for easier passage unless it interferes with range management and resource protection needed for the pasture.

4 To minimize impacts to sensitive resources, new designated motorized dispersed camping access routes should be located away from flood plains and environmentally sensitive areas.

5 Interpretation should follow the themes established in the forest's interpretive strategy with district priorities for implementation to provide consistent interpretive messages and mediums.

6 Where necessary to protect and promote soil and plant restoration, national forest visitor activities should be restricted from entry into soil and plant restoration sites.

7 In designated dispersed camping sites and corridors, mature overstory should be retained to provide shade and screening around hardened sites in order to preserve the recreation setting.

8 To minimize negative resource impacts, dispersed sites should be closed, rehabilitated, or otherwise mitigated when:

- Campsite condition has deteriorated to be heavily or severely impacted;
- Site occupancy exceeds the area's scenic integrity objective;
- There are social use conflicts; and
- Unacceptable environmental damage is occurring.

9 Where forage is limited, overnight campers with recreational livestock should carry cubed, pelleted, or rolled feed to prevent overgrazing of dispersed camping areas. Feeds should be free of viable noxious weed seeds to avoid introduction of noxious weeds.

10 Except in the Long Valley MA, dispersed camping should be provided near but not within 200 feet of riparian, shoreline, or aquatic resources (per Leave No Trace principles) to provide overnight dispersed recreation opportunities.

11 Recreation in the city of Flagstaff municipal watershed (draining into the Inner Basin) should be limited to day-use foot traffic. The area may be closed if unacceptable damage occurs as determined by degradation of water quality.

12 Dispersed downhill snowplay activities, (e.g., sledding) should not occur within a quarter of a mile of paved roads and along the Interstate 17 corridor unless the site-specific conditions (e.g., the slope of hill or hills are oriented away from the road) do not pose a serious hazard.

13 No new trails should be constructed where trail density is contributing to unacceptable disturbance to wildlife. Unacceptable disturbance would be determined at the project- and area-specific level and could include consequences (e.g., roost or nest abandonment, reproductive failure, increased susceptibility to predators, or displacement of populations normally common to the area.

Management Approaches for Dispersed Recreation

Establish long-term partnerships with recreation organizations to help the forest establish, construct, and maintain motorized trails and foster a low impact conservation ethic.

Develop a management plan for the Cinder Hills OHV Area. Within the Cinder Hills OHV Area, work with and establish interpretive messages and programs with the adjacent national monument and volunteers of OHV users, including improved signage, information kiosks, and interpretive messages. Provide signage and information aimed at the following objectives: to prevent lost

riders, to show opportunities of where to ride, to identify dangerous and/or closed areas, to teach riding ethics, and to reduce user conflicts.

Work with partners such as the Arizona Game and Fish Department (AZGFD), Arizona State Parks, and user groups to provide information and education to foster a low impact conservation ethic among OHV riders.

When developing motorized trails, consider their suitability as multiple user trails for nonmotorized recreation.

Recognize new activities that occur on forest lands, while upholding the responsibility to protect the natural environment and the multiple use rights of other visitors.

Work with the Great Western Trail Association and associated groups to maintain the long-distance trail opportunity the Great Western Trail provides.

Provide leadership to coordinate recreation, visitor information, and trail planning among major recreation providers such as the National Park Service, Arizona State Parks,AZGFD concessionaires, chambers of commerce, city and county governments, volunteers, and nonprofits.

Update the memorandum of understanding (MOU) between the National Park Service and Coconino NF. The MOU sets up: (1) how the agencies communicate when management concerns arise and (2) what criteria will be used to make decisions together. For the Flagstaff area national monuments, some considerations may be included for: American Indian access for traditional uses; law enforcement cooperation; plant gathering for personal uses; outfitter-guide parameters; commercial filming parameters; boundary management; fire management; location and management of NPS facilities on Coconino NF lands; National Historic Preservations Act (Section 106); National Environmental Policy Act and Endangered Species Act compliance coordination; shared services for monitoring; and cooperative efforts in managing interpretation and visitor services.

Consider single-use trails (as opposed to multiuser trail designs) to accommodate varying user experiences where trail design features cannot be provided to mitigate user conflicts or provide for a sustainable recreation setting.

Include discussions and input from county trails coordinators and local groups, as well as local citizens, when conducting trail planning. Consider needs for nonmotorized and motorized trails and provide opportunities for both.

Coordinate trailhead parking with future development on adjacent lands so as to be proactive in designing trails and trailheads to maintain access to public lands and protect resources.

Cooperate with local governments to provide for snow removal and safe conditions for travel to and from winter outdoor activities.

Coordinate with the AZGFDand other stakeholders to provide a network of wildlife viewing opportunities.

Cooperate with the AZGFDto stock fish and provide fishing access to meet goals and objectives of the Arizona Cold Water Fisheries Strategic Plan.

Adopt design standards and best management practices for emerging recreation activities as they become available. Adopting management policies for new forms of recreation may be considered as time allows and in accordance with the desired interest these new forms attract in relation to other known recreation uses.

For trail system analyses and decisions, include consideration of universal design for all new construction or rehabilitation proposals.

Provide visitor information and guidelines to members of the public inquiring about dispersed recreation opportunities. Coordinate with city, county, and State law enforcement agencies to assist with the enforcement of Federal laws at known forest dispersed recreation areas on holiday weekends.

Related Plan Content for Dispersed Recreation

See the following: Aquatic Systems; Soil; Wildlife, Fish, and Plants; Invasive Species; Heritage Resources; Roads and Facilities; Special Uses; Scenic Resources; Designated Wilderness Areas; Recommended Wilderness Areas; Wild and Scenic Rivers; National Trails and Scenic Byways

Developed Recreation

(See appendix A, maps 2, 3, and 14.)

General Description for Developed Recreation

Developed facilities are sites where the Forest Service provides multiple amenities for the purpose of visitor comfort and convenience.

Desired Conditions for Developed Recreation

FW-Rec-Dev-DC

1 Developed recreation facilities such as campgrounds and picnic areas are clean, energy efficient, and maintained to standard. Sites are accessible for persons of multiple abilities, reflecting current accessibility guidelines. Developed sites blend with the natural setting, and uses at these areas do not cause damage to ecologically or culturally sensitive areas. Potable water is provided in high-use areas. Developed recreation opportunities are available for both families and groups, with a multitude of recreation experience types.

2 Developed camping facilities provide a level of amenities appropriate for their recreation opportunity spectrum (ROS) setting (see appendix A, map 14) while providing climatic relief and escape from urban life. Developed campgrounds are located outside of flood plains and away from areas prone to flash flooding. Most campgrounds are part of a centralized strategy which consolidates developed recreation opportunities and protects resources. Trails in developed sites connect users to a variety of dispersed recreation opportunities.

3 Developed sites near riparian areas are predominantly day use. Amenities in sites adjacent to water protect water quality and prevent vegetation damage and soil erosion and compaction from fishing, boating, swimming, and other activities. Invasive weeds and aquatic organisms

are not established or transported. There is little human litter as a result of effective enforcement, patrols, and use of refuse and recycling facilities.

4 Group sites in a variety of settings are provided across the forest. Group sites may vary in capacity, including providing space for groups of more than 75 people[40]. Group sites offer users a place to gather near towns and communities and provide adequate sanitation and amenities. Group sites may be colocated with developed campgrounds or day-use facilities, such as Elden Pueblo. Group sites are strategically located to protect resources and minimize the need for large group gatherings in dispersed recreation areas.

5 Information facilities provide places where visitors can find information and learn about natural and cultural resources on the Coconino NF. They are located in strategic locations and are open on days of high visitation (e.g., holidays such as Memorial Day weekend) to best serve the public.

6 Where there are high levels of visitor use, most national forest visitor activities occur at developed sites and on trails designed for high levels of use. High levels of developed recreation use occurring along Upper and Lower Lake Mary and in Oak Creek Canyon are accommodated by facilities that balance resource protection with recreation demand. Recreation sites within these corridors emphasize safety and minimize user conflict along highways. Designated parking spots are provided along highways to prevent resource damage and erosion into nearby waterbodies. The site-specific combination of recreation facilities, services, public information, and enforcement minimize wildlife access to human food and trash.

Guidelines for Developed Recreation

FW-Rec-Dev-G

1 To promote a natural appearing landscape, use of native plant species should be emphasized during planning activities (e.g., design of new sites or improvements to existing sites). Invasives should be removed or treated on existing sites before they become widespread within recreational sites.

2 The Forest Service's "Built Environment Image Guide" (Forest Service, 2001), or subsequent guides for facility design, should be used for public and private facilities across the forest in order to provide for consistency in design of recreation facilities.

3 To protect human health and safety, snowplay areas should be managed to industry standards.

Management Approaches for Developed Recreation

Patrol areas regularly for things such as public safety, facility/resource protection, and fee compliance. The operation or closure of a site is determined by the season's volume of use and operating costs. Sites are operated to the current standards, such as those outlined in the Forest Service publication "Cleaning Recreation Sites" (Forest Service, 1995b) or more recent technical report.

[40] Groups of 75 people or more must apply for a special use permit under the Forest Service's noncommercial group regulations.

Facilities and infrastructure are maintained and replaced as needed using a sustainable mix of Federal funds, other funds, and partners. Through a facilities master planning process and appropriate NEPA, some facilities may be closed or decommissioned as the public's needs change.

Design narratives that provide criteria to determine the appropriate location, capacity, and type of facility required to meet user needs in the context of the forest setting.

Fee areas and concessionaires may be used to maintain and manage developed facilities, particularly in high-use areas. Ensure that Forest Service rules are enforced consistently through contract administration.

Area-specific built environment image guides may be developed to manage specific design issues associated with special areas or unusual circumstances.

Consider mitigation of heavy recreation congestion along U.S. Highway180 with future development of developed recreation facilities, particularly for winter recreation, along the U.S. Highway 89 corridor (and/or other locations).

Adaptively manage recreation facilities and opportunities as needed to shift limited resources to those opportunities.

Related Plan Content for Developed Recreation

See the following: Aquatic Systems; Soil; Wildlife, Fish, and Plants; Invasive Species; Heritage Resources; Roads and Facilities; Special Uses; Scenic Resources; National Trails and Scenic Byways

Scenic Resources

See appendix A, maps 15 and 16.

General Description for Scenic Resources

The forest is divided into four levels of desired scenic integrity: very high, high, moderate, and low. These levels set objectives for the amount of variation from the existing landscape character that is permissible within the scenic integrity level, according to Agriculture Handbook Number 701, "Landscape Aesthetics: A Handbook for Scenery Management." Buildings and structures are not always considered a negative in terms of existing scenic integrity. When they add to the sense of place or reflect the cultural legacy of an area, they contribute to scenic integrity. For instance, well-designed campgrounds can enhance recreation opportunities and enjoyment of scenery.

Scenic integrity objectives (SIOs) are defined by degrees or levels of alteration from the desired landscape character and the intent to achieve the highest possible scenic integrity. Some areas of the forest may require restoration in order to move toward the conditions described in the desired landscape character.

Direction for the forest's desired landscape character is found under each management area (see chapter 3) and may be very similar to the existing landscape. Even though the management area boundaries are distinct, where a desired landscape character applies on the ground is not always distinct and may vary over time with changes from natural disturbance and climate change.

Management areas around the boundaries may exhibit or blend with the landscape character of the adjacent management area. On-the-ground interpretation of these desired landscape character descriptions is acceptable based on site-specific knowledge.

Desired Conditions for Scenic Resources

FW-Scenic-DC

1 The scenic values of the Coconino NF are conserved and enhanced. Visitors see that the forest is being actively managed through visual cues such as seeing firebreaks with native wildflowers, grasses, and forbs; some fire effects; and tree thinning to frame views from trails and developed recreation sites.

2 Vegetation treatments contribute to the scenic integrity of the desired landscape character (see chapter 3, "Management Areas"), especially in highly sensitive areas. Management-created debris, such as slash along Concern Level 1 and 2 travel routes, are located and arranged to minimize their visual disturbance in the immediate foreground (up to 300 feet)[41], and slash piles in that immediate foreground are not evident once they are burned or scattered. Openings and stand boundaries are naturally shaped and are oriented to contours and existing vegetation patterns to blend with existing landscape characteristics, except where other natural resource concerns require minimal treatment along powerline corridors.

3 Constructed features, facilities, and management activities closely follow the form, line, color, texture, and pattern common to the desired landscape character to remain visually subordinate to the surrounding landscape, except where the size or design of a structure is impossible to subordinate. For those exceptions, the structures complement the desired landscape character.

4 Structures required for serving public use of scenic and recreation resources include viewing platforms such as developed sites, roads, parking areas, trails, trailheads, buildings, decks, and observation points. To be functional, these facilities are normally visible in the immediate foregrounds. These structures are part of the expected image of the public being served; however, allowable limits of contrasts do not exceed the structure's functionality. Travel route structures need to be clearly distinguishable for a distance commensurate with normal speeds or intended use of such routes. Structures exempted from meeting high SIOs in the immediate foreground includes those associated with interstates, major state highways, and regional travelways and associated structures. This exception does not apply to segments that are designated State or Federal scenic byways. These structures harmonize with the surrounding features to the extent possible without compromising safety standards for the type of travel route.

5 Long term soil and plant productivity, proper functioning ecosystems, and clean water are considered important components of scenic quality. Rock pits, borrow areas, open pit mines, and restored gullies have very low scenic integrity and are not seen from visually sensitive travelways and viewing points to the extent possible[42]. Cultural and historic features, young cinder cones, and lava flows are recognized for their inherent scenic values. Native plant rehabilitation is carried out in disturbed areas to speed scenic quality recovery. Natural land

[41] The immediate foreground may be less than 300 feet as determined by site-specific visibility modeling.

[42] These locations are not mapped on the Scenic Integrity Objective Map but may be determined through appropriate site-specific NEPA without a plan amendment.

forms and vegetation are used, to the extent possible, to screen facilities from important viewing locations such as scenic trails and byways.

Objectives for Scenic Resources

FW-Scenic-O

1 Rehabilitate[43] at least 25,000 acres that do not meet the desired scenic integrity objective (SIO) by at least one level within 15 years of plan approval.

Guidelines for Scenic Resources

FW-Scenic-G

1 To maintain SIOs, management activities that are inconsistent with the SIO and whose effects persist in the long term should not occur unless a decision is made to change the SIO[44]. Site-specific exceptions can be made based on lower site productivity, soil conditions, and climate without changing the SIO. Additional mitigation measures may be needed in these cases.

2 To maintain consistency with the Scenery Management System in the long-term:

- Deviations[45] in areas with high SIO should not be evident even if they are present.
- Deviations in areas with moderate SIO should be allowed but remain visually subordinate to the landscape being viewed.
- Deviations in areas with low SIO should borrow valued attributes from the landscape being viewed, even though the deviations may begin to dominate the views.

3 In areas of high and moderate scenic integrity, new infrastructure should, when safety and logistical constraints allow:

- Use natural contours to minimize the appearance of structures.
- Use neutral, nonreflective colors and repeat line, form, texture, pattern, and scale to blend structures into their surroundings.
- Make use of existing infrastructure to camouflage new structures that are not part of the valued landscape.

4 Visually attractive live and dead trees, some large woody debris, and understory shrubs[46] should be favored when leaving vegetation in the foreground (half a mile or less)[47] of Concern Level 1 and 2 travel routes in order to enhance the desired landscape character.

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[43] In the context of scenery management, rehabilitation is a short-term management goal used to return a landscape with existing visual impacts and deviations to a desired level of scenic quality formerly found in the natural landscape.

[44] A decision to change the scenic integrity objectives will be documented in a project-level NEPA decision document and in the plan Desired Scenic Integrity Objective Map.

[45] Deviations apply to the long term and at a landscape scale and are not intended to restrict short-term impacts to scenery from construction, fire management, drilling rigs, or other short-term activities. The timeframe for “long term” and “short term” will be defined in the project-level analysis based on the potential effects of the proposed activities.

[46] Visually attractive trees are those that are pointed out for particular scenic value in the management area desired conditions.

5 Stems should be flush cut, if possible, or cut less than 6 inches above ground (uphill side) in the immediate foreground (300 feet or less) of Concern Level 1 and 2 travel routes where topography and operational safety allows in order to minimize the scenic impact of management activities.

6 When possible, new log landings, roads, and designated skid trails should be located out of view of Concern Level 1 and 2 travel routes to avoid observation of bare mineral soil. When avoiding these locations is not possible, the evidence of these activities should be restored following completion of the activity to harmonize with the surrounding landscape.

7 To minimize disruption of the visual landscape, straight lines and geometric shapes should be avoided at the edges of openings and stand boundaries.

8 Evidence of fire activities[48] should be dominant for no more than 3 years after burning in areas of high scenic integrity and 5 years in moderate scenic integrity in order to maintain SIOs.

9 In order to maintain the SIO, powerlines in areas of moderate scenic integrity should not be widened but may accommodate additional capacity within the existing corridor.

10 In situations where wildlife needs require built structures to protect habitat or enhance connectivity (e.g., highway overpasses), the structures should be designed to harmonize with the landscape without compromising functionality. When mitigation is not sufficient to retain the SIOs, these projects are exempted from the need to amend the plan.

Management Approaches for Scenic Resources

Priorities for rehabilitation of sites and facilities that do not meet SIOs consider the following:

- The relative importance of the area and the amount of deviation from the SIOs; "foreground" of high public use areas has highest priority.
- The length of time it will take natural processes to reduce the visual impacts and meet the SIO.
- The length of time it will take rehabilitation measures to meet the SIOs.

Cooperate with other entities, such as the Arizona Department of Transportation, local governments, and commercial and private entities to protect scenic integrity on and adjacent to the national forest.

Collaborate with State and local partners on the management of scenic resources in the immediate foreground of State and Federal recognized scenic byways.

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[47] The foreground may be less than half a mile as determined by site-specific visibility modeling.

[48] Evidence of fire activities includes constructed line, reopened roads, helipads, large unburned piles and other manmade features that are used in wildfire management and prescribed fire. It does not refer to evidence of fire that is within the natural range of variability, such as an appropriate amount of burned standing trees, charred needles, and tree trunks. In areas where uncharacteristic wildfire has occurred, recovery to high or moderate scenic integrity objectives may exceed these timeframes.

Consider the use of forest product or vegetation management permits to make vegetation transition at the edge of powerline rights-of-way less abrupt or visible, where it is necessary to clear the right-of-way boundary to meet national standards for powerline safety.

Any changes to SIOs should be updated on the plan SIO map.

Related Plan Content for Scenic Resources

See the following: Aquatic Systems; Soil; Vegetation; Wildlife, Fish, and Plants; Fire Management; Forest Products; Energy and Minerals; Roads and Facilities; Land Adjustments; Special Uses; Recreation

Chapter 3. Management Areas and Special Areas

Introduction

This chapter sets forth plan decisions and other content that apply to specific areas on the forest as delineated by management areas. Plan decisions can be visually distinguished and referenced easily in this chapter by a coding system (described in detail in chapter 1 and figure 2) that identifies: (1) where a plan decision is applicable; (2) what resource area is affected by the decision; and (3) what type of plan decision is being made.

Management areas (MAs) are areas that have similar management intent and a common management strategy that is more specific than the forestwide guidance provided in chapter 2. The direction for management areas does not substitute for or repeat forestwide direction, but rather it provides additional direction for the applicable area. In the event that a plan decision in this section and the forestwide component in another section conflict, the more restrictive plan decision generally prevails. A project- or activity-level evaluation, however, may be required to resolve the conflict. See chapter 1 for descriptions of plan decisions (e.g., desired conditions, objectives, guidelines, and standards) and other content (e.g., general description and background, and management approaches).

Some management areas are special areas that have been designated by Congress or an office of the Executive Branch. They are managed to protect the special features or character for which they were designated and must be managed in accordance with relevant law, regulation, policy, and any area-specific management plan (e.g., the "Verde River Comprehensive River Management Plan").

There are two management areas that overlay the Sedona/Oak Creek MA. The Oak Creek Canyon MA and House Mountain-Lowlands MA are both subject to direction for the Sedona/Oak Creek MA and have unique direction that applies only to those specific overlay areas. There are several guidelines in the Sedona/Oak Creek MA to which the House Mountain-Lowlands MA is an exception.

Scenery desired conditions (i.e., desired landscape character) for wilderness, wild and scenic rivers, and other special areas are described in the management area direction.

Several of the management areas are designated special areas such as wilderness. These are places that have been designated by statute or through past administrative process because of their unique or special characteristics. In addition, there are two categories of preliminary administrative recommendations that occur as separate management areas: recommended research natural areas and recommended wilderness. Those areas recommended for designation are managed to protect their special characteristics until a decision on the designation is made.

Management Areas

See appendix A, map 1.

Pine Belt

General Description and Background for Pine Belt Management Area

The Pine Belt MA is the largest on the forest. It extends from the northwestern forest boundary then continues southeast where it splits around the Long Valley MA and then ends at the northern boundary of the Upper Clear Creek 5th code watershed. The western edge of the management area is defined by the Mogollon Rim and features of this management area may extend down its slope and into adjacent management areas. On the eastern boundary is Anderson Mesa MA. The transition between these two management areas is defined by the presence of piñon-juniper and Great Basin grasslands. The transition is gradual, and there may be areas that have a mixed character. This management area is a portion of the largest ponderosa pine landscape in Arizona.

The desired conditions for scenery from this management area may also apply to the Fort Valley-Mount Elden and the Flagstaff Neighborwoods MAs if the site being analyzed at the project level fits the landscape character described for this management area[49]. The desired conditions for scenery from this management area apply within the Long Valley MA north of State Highway 87. All desired conditions for this management area apply within the Walnut Canyon MA.

The Arizona Trail crosses this management area.

Desired Conditions for Pine Belt Management Area

MA-PineBelt-DC

Scenery – Desired Landscape Character

1 The Pine Belt MA itself is flat to gently sloping with scattered, steeper landforms including Mormon Mountain, lands around Kendrick Peak, the West Clear Creek drainage, Walnut Canyon, Pumphouse Wash, Fry Canyon, Saddle Mountain, a number of prominent hills and mountains in the northern portion of the management area and various escarpments throughout. On the northern end, evidence of volcanic geology is more common.

2 This area is valued for its continuous stands of uneven-aged ponderosa pine, old-growth "yellow-belly" ponderosa pine stands, and beautiful lakes for boating and fishing. This management area is comprised of Ponderosa Pine and Piñon-Juniper Woodlands vegetation types which cluster around broad expanses of grassy openings and picturesque lakes. Ponderosa pine is all-aged and includes large trees with open, well-formed crowns. The forest is generally open and parklike with a diverse understory of grasses and shrubs. Tree conditions in places such as north-facing slopes and canyon bottoms are sometimes more dense. The distribution and class of trees across the landscape corresponds with the ecological desired conditions for this vegetation type. Old growth ponderosa pines as groups or as individual specimens provide a valued landscape feature that adds to the sense of diversity and discovery in this zone. Snags, top-killed trees, down logs, and other evidence of fire and wind disturbance occur individually and in patches of varying sizes. They provide an intriguing feature whose distribution on the landscape varies over time. Standing dead

[49] Scenery desired conditions for Pine Belt MA may be used for projects taking place in Flagstaff Neighborwoods MA when the physical, biological, and cultural attributes of the project site match the characteristics described in this section.

trees provide character and wildlife habitat and some are retained (see the desired conditions for the ponderosa pine vegetation type for more information).

3 Small natural and artificial lakes and wetlands are scattered throughout this management area. They are highly valued for their recreation opportunities, especially boating, fishing, and scenic attributes. Lakes provide a viewing platform for mountains and hillsides in the vicinity and some provide views of the San Francisco Peaks. The presence of water provides for ecological and visual diversity and wildlife viewing.

4 Gambel oak and aspen provide a desirable visual contrast to the evergreen pine in fall. In winter, this management area provides recreationists a white, snow-covered landscape that contrasts with evergreen trees. In the summer, it provides cool shady areas for a variety of recreation activities. Arizona walnut trees in Walnut Canyon provide a valued scenic feature in this management area that contributes an interesting bark and texture against the winter sky and yellow fall color.

5 Clear, dark night skies are valued for stargazing and as a professional astronomy resource. Astronomical facilities are present and visible in defined areas.

6 Trails and recreation use are located and managed to reduce impacts to woody riparian vegetation and riparian habitat in Pumphouse Wash.

Guidelines for Pine Belt Management Area

MA-PineBelt-G

1 In Pumphouse Wash, road and trail rehabilitation work should be focused on decreasing erosion and sedimentation that flow down canyon and into Oak Creek Canyon to improve and maintain watershed conditions and fragile and rare plant communities.

Volcanic Woodlands

General Description and Background for Volcanic Woodlands Management Area

The Volcanic Woodlands MA is largely defined by the north and northeast extents of the San Francisco Peaks volcanic field associated with more recent volcanic activity. Volcanic features associated with Sunset Crater National Monument on National Forest System lands are an interface of overlapping management concerns.

A number of cinder cones and mountains in this management area are important cultural and religious places for several tribes. They are the sources of spiritual power with shrines that are the focal point for prayers of several religious societies. There is a very high cultural site density in this management area.

Desired Conditions for Volcanic Woodlands Management Area

MA-VolcanWd-DC

Scenery – Desired Landscape Character

1 This management area is characterized by gently rolling topography with sudden inclusions of youthful black, red, and gray cinder cones; volcanic craters and vents; and rugged lava flows. Areas with these volcanic features have open growing ponderosa pines which may

have unique forms and shapes due to the harshness of the growing conditions. The forest understory is often sparse with patches of native grass or shrubs. Lava flow areas are distinctive and generally devoid of vegetation, being dominated by unique rock forms. Most of the management area is characterized by Piñon-Juniper Woodlands interspersed with grasslands on gently rolling to flat topography. Water is a rare but valued feature throughout this MA. The southwestern boundary of this management area blends gradually into the ponderosa pine characteristics of adjacent management areas.

2 The area is valued for its volcanic scenery and distinctive features such as Red Mountain (a designated geological area), Cochrane Hill, and other cinder cones and lava flows. Volcanic features such as cinder cones and lava flows are recognized for their cultural and religious importance to several tribes. Located in this MA are Sunset Crater National Monument, Cinder Hills OHV Recreation Area, and Painted Desert Vista. Outside of the Cinder Hills OHV area, cinder cones are generally undisturbed by management activity and the volcanic features maintain their integrity, form, and process. Designated motorized recreation opportunities are valued for their scenic views, even though motorized recreation areas can impact the scenery where they occur.

Roads

3 Deadman Wash provides large tracts of unroaded landscape for disturbance-sensitive species and remote recreation experiences.

Management Approaches for Volcanic Woodlands Management Area

Coordinate with the Flagstaff area monuments to provide for compatible management of scenic resources within the area that is geologically related to Sunset Crater.

Consult with tribes to identify volcanic features of cultural importance in project planning.

Painted Desert

General Description and Background for Painted Desert Management Area

The Painted Desert MA is predominantly a transition between Ponderosa Pine and Piñon-Juniper Woodlands vegetation types and the Painted Desert itself. Views of the Painted Desert are in the background from this area, but it lacks some of the Painted Desert characteristic ecological features in the foreground.

Desired Conditions for Painted Desert Management Area

MA-PntdDsrt-DC

Scenery – Desired Landscape Character

1 Topography is relatively flat with the exception of Deadman Wash and lands around Doney Picnic Area. Vegetation is comprised of grasslands and Piñon-Juniper Woodlands opening onto a vast, largely undeveloped, desert landscape in the background. Cultural features and evidence of prehistoric habitation are the most predominant scenic attractions in this management area. Panoramic views of volcanic fields and the characteristic Painted Desert land formations are visible from this management area.

San Francisco Peaks

General Description and Background for San Francisco Peaks Management Area

The San Francisco Peaks MA is characterized by distinctive mountains with steep slopes and alpine peaks, including the highest point in Arizona, Humphreys Peak. The San Francisco Peaks—including Kachina Peaks Wilderness—are sacred to many American Indian tribes as a significant religious landmark and traditional cultural place that contains many shrines and sacred places. For the Hopi, the San Francisco Peaks are the single most important place central to their religious beliefs. It is an icon that gives them their identity as a people. The San Francisco Peaks are one of several mountains that demarcate the boundaries of the traditional and sacred heartland of the Hopi, Navajo, Zuni, Acoma, Apache, Havasupai, and Hualapai. Many tribes continue to conduct centuries-old religious observances on the San Francisco Peaks that are central to their culture and religion.

The desired conditions for scenery from this management area may also apply to the Fort Valley-Mount Elden and the Flagstaff Neighborwoods MAs if the site being analyzed at the project level fits the landscape character described for this management area[50].

The Arizona Trail crosses this management area.

Desired Conditions for San Francisco Peaks Management Area

MA-Peaks-DC

Scenery – Desired Landscape Character

1 The San Francisco Peaks are a distinctive volcanic mountain with several alpine peaks and steep slopes, and it is a focal point of background views from adjacent management areas up to 80 miles away, including Grand Canyon National Park and the Verde Valley. The middleground of views from the peaks is dominated by sky, air, and clouds with background views of dry steep canyons and expansive forests.

2 Vegetation varies along the elevation gradient from open ponderosa pine stands with views of the surrounding landscape to sun-dappled shade of Spruce-Fir and Mixed Conifer to rocky and sparsely vegetated alpine communities. Within these vegetation types, steep, cool drainages, and fire disturbance create microclimates with a surprising diversity of landscape features such as high elevation mountain meadows, communities of bristlecone pine, and aspen that contrast with dark evergreen surroundings. Aspen and grasslands, in particular, create openings that provide a sense of the surrounding landscape. The lower slopes of this MA gradually flatten and blend into the surrounding plateau.

3 The San Francisco Peaks are highly valued for their scenic character year round. In autumn, aspen lights up the mountains with beautiful yellow, gold, and orange colors contrasted against dark conifer forests. Wildflowers provide dramatic splashes of color in mountain meadows in the spring and late summer. In winter, the snow-covered peaks can be viewed from great distances, and the area is a destination for snowplay.

[50] Scenery desired conditions for San Francisco Peaks MA may be used for projects taking place in Flagstaff Neighborwoods MA when the physical, biological, and cultural attributes of the project site match the characteristics described in this section.

4 The San Francisco Peaks are sacred to many American Indian tribes and are a significant religious and traditional place. There are individual shrines and sacred places that are valued for their cultural setting on the mountain. The area is valued for its heritage resources and cultural importance, spectacular scenery and high scenic integrity, cool climate escape from desert heat, a diverse range of year-round recreation opportunities, and its distinctive landscape features.

Fort Valley/Mount Elden

General Description for Fort Valley/Mount Elden Management Area

The Fort Valley/Mount Elden MA is on the north side of Flagstaff and south of the San Francisco Peaks, and it provides a wide variety of motorized and nonmotorized recreation experiences that can be easily accessed from city parks and the Flagstaff Urban Trail System.

The desired conditions for scenery from the San Francisco Peaks and Pine Belt MAs may also apply to the Fort Valley-Mount Elden MA if the site being analyzed at the project level fits the landscape character described for those management areas[51].

Desired Conditions for Fort Valley/Mount Elden Management Area

MA-FtVElden-DC

Dispersed Recreation

1 The varied topography of the Fort Valley/Mount Elden MA and Dry Lake Hills Trail System offers a variety of trail experiences for hikers, mountain bikers, and equestrians. The Dry Lake Hills Trail System provides nonmotorized recreation trail opportunities. The trail system is stable and does not increase significantly in mileage. The base of Mount Elden is primarily used for nonmotorized recreation in order to protect deer winter habitat and cultural sites and to provide for high levels of nonmotorized recreation. Fort Valley provides a mix of motorized and nonmotorized recreation opportunities.

2 In the Fort Valley/Mount Elden MA, extensive signage, brochures, and patrols allow visitors to easily find trails and facilities. This area receives a great deal of day-use recreation, primarily due to the close proximity to Flagstaff. Throughout this area “hub” trailheads provide access to a variety of motorized and nonmotorized trails to control access and provide interpretive materials to the most visitors possible.

Guidelines for Fort Valley/Mount Elden Management Area

MA-FtVElden-G

Dispersed Recreation

1 Waterline Road should be maintained as a high traffic nonmotorized recreation corridor in order to maintain the recreation setting and limit motorized intrusion into wilderness.

[51] This means that the specialist could be working on a project in the Fort Valley/Mount Elden MA but looking at scenery that more closely matches the landscape character of the Pine Belt MA or for the San Francisco Peaks MA depending on the physical, biological, and cultural attributes of the viewshed. In those cases, the scenery desired conditions from the management area that best matches the setting should be applied.

2 The El Paso Natural Gas line should be used as a trail in conjunction with the Mt. Elden/Dry Lake Hills Trail System in order to provide access for the permittee and the public.

Flagstaff Neighborwoods

General Description for Flagstaff Neighborwoods Management Area

The Flagstaff Neighborwoods MA is the area that surrounds Flagstaff and provides a great deal of recreation and access for the community; it was known as the Urban-Rural Interface under the 1987 plan.

The desired conditions for scenery from Anderson Mesa, San Francisco Peaks, and Pine Belt MAs may also apply to the Flagstaff Neighborwoods MA if the site being analyzed at the project level fits the landscape character described for those management areas[52].

Desired Conditions for Flagstaff Neighborwoods Management Area

MA-FlagN-DC

Scenery

1 Natural landscape is highly valued by local residents and visitors. National Forest System lands provide the backdrop for the community's character while accommodating features that are more typical of an urban or rural setting. Infrastructure and developments that serve a broad public interest are sometimes evident but still subordinate to the landscape. Recreation developments contribute to the area's unique sense of place through use of native materials; mimicking line, form, color, and texture of the surrounding landscape; or use of identifiable Forest Service symbols and historic features.

Dispersed Recreation

2 Recreation opportunities near Flagstaff emphasize day and overnight dispersed recreation opportunities with few developed facilities, except in established developed campgrounds. Trails are accessed through strategically located access points with an interconnected trail system. The National Forest System trail system connects to the Flagstaff Urban Trail system to provide continuous access to urban recreation opportunities. Many trails in this area provide easy to moderate recreation opportunities with well-defined trails and clear signage for easy way-finding.

3 Along Woody Ridge, there are large tracts of unfragmented habitat and back-country recreation opportunities. Remote characteristics are maintained as new residential development occurs on the west side of Flagstaff. Woody Ridge has semiprimitive nonmotorized recreation opportunities that are compatible with walk-in hunting.

[52] This means that the specialist could be working on a project in the Flagstaff Neighborwoods MA but looking at scenery that more closely matches the landscape character of the Pine Belt MA or for the San Francisco Peaks MA depending on the physical, biological, and cultural attributes of the viewshed. In those cases, the scenery desired conditions from the management area that best matches the setting should be applied.

Motorized Recreation

4 Passthrough corridors for vehicles, off-highway vehicles (OHVs), and motorcycles lead to separate motorized trails or to secondary forest system roads, except where this is inconsistent with the desired ROS.

Objectives for Flagstaff Neighborwoods Management Area

MA-FlagN-O

Dispersed Recreation

1 Within 10 years of plan approval, create 3 additional connections with the Flagstaff Urban Trail System, Flagstaff Loop Trail, and/or Coconino County trails.

2 Within 7 to 10 years of plan approval, complete construction of the portions of the Flagstaff Loop Trail on the Coconino NF.

Management Approaches for Flagstaff Neighborwoods Management Area

Elden Pueblo public program provides one-on-one, hands-on, experiential archaeology for school children and the public in partnership with the Flagstaff School System, Arizona Natural History Association, Arizona Archaeological Society, and Museum of Northern Arizona.

Walnut Canyon

General Description for Walnut Canyon Management Area

Walnut Canyon dominates this MA, running from the end of Lower Lake Mary to Fisher Point and turning east toward Winona. Cultural sites are numerous, and the canyon holds religious value for American Indian tribes. The scenery is spectacular. The stark backdrop of the cinder cones provides a dramatic contrast to the canyon depths. The steepest section of the canyon with the most archaeological sites is located within Walnut Canyon National Monument. The canyon itself supports a multitude of vegetation types and habitats from steep north facing mixed conifer to riparian vegetation at the canyon bottom. Disturbance sensitive wildlife species occur in secluded portions of the canyon and along the canyon rim. Lands outside of the canyon are ponderosa pine with Gambel oak understory and some piñon and juniper. There are National Forest System trails, including the Arizona National Scenic Trail, in the canyon itself and along the rim. Fisher Point is a popular destination for hikers, mountain bikers, and outfitter-guided horse trips. Canyon Vista is popular for climbing. The area north and west of Walnut Canyon provides dispersed recreation opportunities and receives heavy use adjacent to private land and Lake Mary Road. Activities include hiking, horseback riding, and mountain biking.

No paved roads or utility corridors occur except on the boundaries. Major roads provide access and other areas are closed to vehicles. Walnut Canyon and its major side drainages are closed to motorized vehicles. The areas south and east of Walnut Canyon provide more remote dispersed recreation opportunities including motorized travelways.

The desired conditions for this area are in addition to those described for the Pine Belt MA.

Desired Conditions for Walnut Canyon Management Area

MA-Walnut-DC

Roads

1 Improvements to meadows and stream channels degraded by road construction or unauthorized roads increase herbaceous ground cover and litter and reduce soil erosion. National Forest System roads and trails are maintained so that accelerated soil erosion is minimal. Non-National Forest System roads are rehabilitated, and poorly located roads are relocated.

Developed Recreation

2 The Canyon Vista area provides parking, day-use trails, and overnight camping in developed campgrounds for individuals and groups. Facilities at the site limit resource impacts and provide a camping experience at the less developed end of the spectrum for developed campgrounds.

Standards for Walnut Canyon Management Area

MA-Walnut-S

Lands Special Uses

1 No paved roads or utility corridors occur except on the boundaries of the Walnut Canyon MA.

Lands Adjustment

2 In the Walnut Canyon MA, national forest jurisdiction will be maintained for all National Forest System lands. No land exchanges will occur unless the purpose is to acquire land within this management area through exchange of national forest lands elsewhere.

Guidelines for Walnut Canyon Management Area

MA-Walnut-G

Lands Special Uses

1 Research projects within rock shelters and archaeological site caves should require a permit in order to protect the associated resource. Permits are issued on a case-by-case basis.

Roads

2 Road construction activities should be designed to maintain or improve soil condition and watershed function.

Anderson Mesa

General Description and Background for Anderson Mesa Management Area

Anderson Mesa MA's major vegetation types are Piñon-Juniper and Great Basin Grasslands. The western and southern parts of this management area transition gradually to Ponderosa Pine. This area provides a background to Winona and areas east of the forest. The Arizona Trail also crosses this management area.

Anderson Mesa is the location of six large pueblos that are the last archaeological expression of the prehistoric Sinagua culture as it transformed into the nascent Hopi and Zuni cultures in the 1400s. Anderson Mesa is also the location of early 20th century homesteads of several families that continue to practice traditional cattle ranching in the region today.

The desired conditions for scenery from this management area may also apply to the Flagstaff Neighborwoods MA if the site being analyzed at the project level fits the landscape character described for this management area[53].

The Arizona Trail crosses this management area.

Desired Conditions for Anderson Mesa Management Area

MA-AMesa-DC

Scenery – Desired Landscape Character

1 The Anderson Mesa MA has mostly gently sloping to flat topography. The basalt that caps the mesa forms steep escarpments along the boundary of the mesa. Distinctive steep canyons are interspersed along the eastern forest boundary, particularly Padre Canyon, Jacks Canyon, and Upper Clear Creek Canyon. These canyons are distinctive inclusions in this management area which is otherwise dominated by grasslands and Piñon-Juniper Woodlands. The Great Basin Grasslands of the mesa provide large open landscapes with individual trees surrounded by Piñon-Juniper and Ponderosa Pine forests. Grasslands are a valued component of the landscape character where they naturally occur. Anderson Mesa is a destination for hunting and wildlife viewing because of its outstanding wildlife habitat. Other distinctive features in this management area are wetlands such as Marshall Lake and lakes, such as Ashurst Lake, Hay Lake, and Long Lake, which contribute to recreation settings and wildlife habitat (see Aquatic Systems for more details).

2 Roads and trails do not dominate any portion of the landscape and are only provided where necessary for access to the area.

3 Clear, dark night skies are valued for stargazing and as a professional astronomical resource. Astronomical facilities are present and visible in defined areas. In spring and late summer, blankets of yellow wildflowers may dominant the grasslands.

4 The presence of large prehistoric pueblos and historic ranches that are still operating contribute to the sense of history and place that Anderson Mesa provides to the families of several Hopi and Zuni clans as well as Euroamerican ranching families today.

5 Wildlife viewing and hunting opportunities are emphasized in this area. The Anderson Mesa pronghorn herd has a sustainable population, is able to move freely across the grasslands and open areas of the forest and woodlands, and can easily access winter range. Functioning wetlands provide nesting and migratory habitat for waterfowl and shorebirds; foraging habitat for peregrine falcons, ferruginous hawks, and other raptors; and water for a variety of species, consistent with type of wetland.

[53] Scenery desired conditions for Anderson Mesa MA may be used for projects taking place in the Flagstaff Neighborwoods MA when the physical, biological, and cultural attributes of the project site match the characteristics described in this section.

Long Valley

General Description for Long Valley Management Area

Long Valley is a corridor of intensive recreation use on the Mogollon Rim Ranger District. At its center is Clint's Well and Happy Jack and includes C.C. Cragin (Blue Ridge) Reservoir and Knoll Lake Recreation Area. The area receives heavy weekend use from dispersed campers, boaters, anglers, and motorized recreationists. Commercial businesses in the area provide a hub to visitors for staging, resupplying, and gathering information about the forest, which supports long-term camping throughout the management area.

The desired conditions for scenery in the portion of the Long Valley MA north of State Highway 87 are the same as those described for the Pine Belt MA, and in the portion of the Long Valley MA south of State Highway 87, they are the same as those described for the Upper Clear Creek MA.

Desired Conditions for Long Valley Management Area

MA-LongV-DC

1 Long Valley provides a unique mix of well preserved, semiprimitive settings interspersed with a landscape that trends toward a rural or roaded natural setting with developed roads and trails and a variety of camping opportunities. The evidence of an actively managed forested landscape is common and consistent with the recreation setting in the more developed parts of the management area. Reservoirs, highways, and private property and associated improvements contribute to the more managed setting and sense of community in the area.

2 Long Valley has many opportunities for motorized dispersed camping and associated recreation uses. Dispersed camping corridors along maintained roads are common in proximity to highways and Forest Road 300. Developed campgrounds, rental cabins, recreation residences, and reservoirs provide developed recreation opportunities in a roaded natural setting.

3 Managed recreation opportunities are provided year round in some locations. Solitude and nonmotorized opportunities are available on trails mostly in the ridges and canyon country. Canyons provide less managed settings with low disturbance that support wildlife and nonmotorized recreation. Recreation in proximity to meadows and wetlands is primarily nonmotorized, and camping does not negatively impact this resource. The management area provides diverse venues for water-based recreation, particularly fishing on rivers and streams, boating on lakes (motorized and nonmotorized), and other lakeside recreation activities. Special use sites are available in this area for events and large groups.

4 Cabins, lookouts, and guard stations provide insight into local Forest Service history and are managed for their functional purposes and as points of interest for visitors in some locations. Some cabins are considered for recreation rental opportunities.

5 Land encroachment issues are resolved as opportunities arise.

Guidelines for Long Valley Management Area

MA-LngVal-G

1 Dispersed camping within 200 feet of riparian shoreline and aquatic resources should occur only where designated sites are provided[54].

Management Approaches for Long Valley Management Area

Coordinate with local commercial businesses to disperse information to the local public and visitors.

Inventory dispersed recreation sites and evaluate future management options for managing dispersed recreation opportunities in the management area.

Upper Clear Creek

General Description and Background for Upper Clear Creek Management Area

The Upper Clear Creek MA was formerly known as the East Clear Creek watershed until the Natural Resource Conservation Service changed the name.

The Mogollon Rim makes up the southern boundary of the Coconino NF and the southern limit of the Colorado Plateau, draining north into Upper Clear Creek. It is part of the traditional homeland of the Western Tonto Apache, the scene of numerous skirmishes during the Apache Wars of the 1860s to 1880s, and a passageway for many pioneering families who settled central Arizona in the latter part of the 19th and early 20th centuries.

The desired conditions for scenery from this management area may also apply to the Long Valley MA south of State Highway 87.

The Arizona Trail crosses this management area.

Desired Conditions for Upper Clear Creek Management Area

MA-UppClr-DC

Scenery – Desired Landscape Character

1 This management area is characterized by the Mogollon Rim, a rugged escarpment with steep, rocky drainages and narrow canyons and ridges alternating from east to west. This canyon setting provides opportunities for quiet and solitude. Canyons provide less managed settings with low disturbance that support wildlife and nonmotorized recreation, except along designated roads. Vegetation is composed mostly of Ponderosa Pine and Mixed Conifer forests with inclusions of maples, aspen, and other deciduous trees offering variety year round. In autumn, magnificent yellows, golds, and reds contrast against a dark conifer forest background. Distinctive features in this management area include: C.C. Cragin Reservoir; Knoll Lake; Potato Lake; and scenic drainages including Upper Clear Creek, Barbershop Canyon, Dane Canyon, and Leonard Canyon, to name a few. Leonard Creek and Upper Clear Creek have perennial flowing water in a steep canyon setting.

[54] This is an exception to the forestwide guideline under dispersed recreation.

2 The Apache wars and prehistoric and historic settlement are recognized as culturally significant features related to the General Crook National Recreation Trail, which partly follows the "Palatkwabi Trail," an ancient travel route from the Hopi Mesas to the Verde Valley that was used by the Spanish, American military, and early settlers. The Arizona National Scenic Trail provides long distance hiking, biking, and equestrian riding opportunities. Forest Road 300 along the Mogollon Rim provides views into adjacent mountain ranges, forest lands, and communities below. Areas with evidence of wildfires along the rim create views to distant vistas. The Apache-Sitgreaves National Forests to the east are similar in character to this management area. North of Upper Clear Creek, the terrain starts to become more gradual and blends into the Pine Belt MA.

Verde Valley

General Description and Background for Verde Valley Management Area

The Verde Valley Landscape MA is located within the Tonto Transition Ecological Section. The vegetation is predominantly Semidesert Grasslands, Desert Communities, and Riparian. The Verde Valley has a continuous history of human occupation, beginning with Clovis Paleoindian mammoth hunters of 12,000 years ago. The Verde Valley comprised the southern Sinagua culture area until A.D. 1400, as highlighted by Montezuma Castle, Montezuma Well, and Tuzigoot National Monuments and the Clear Creek Ruins, Red Tank Draw, Sacred Mountain, and V-V Rock Art Heritage Sites of the Coconino NF. About A.D. 1250, the northeastern Yavapai entered the Verde Valley, and later, the Tonto Apache. Both groups continue to live in the Verde Valley as the Yavapai-Apache Nation. Euroamerican miners, farmers, and ranchers spread into the Verde Valley starting in the 1860s, and several of those pioneering families still work in the Camp Verde and Sedona areas. Fort Verde State Park; the towns of Camp Verde, Cottonwood, and Clarkdale; General George Crook Road; 13 Mile Rock; and scattered ranches represent the historic period growth of the Verde Valley. The Verde Valley has a long history of prehistoric and historic settlement as highlighted by national monuments and historic trails within the forest's administrative boundary.

The desired conditions for scenery from this management area may also apply to House Mountain-Lowlands MA if the site being analyzed at the project level fits the landscape character described for this management area[55].

Desired Conditions for Verde Valley Management Area

MA-VerdeV-DC

Scenery – Desired Landscape Character

1 This management area is defined by the large Verde Valley and Semidesert Grasslands and Desert Communities. Broad valleys with lonely rounded hills are common in the north and western portion of this MA and steep drainages characterize the eastern portion. The Verde River, designated as a wild and scenic river, separates the Prescott and Coconino National Forests on the southwest boundary of the forest and provides a lush source of perennial

[55] Scenery desired conditions for Verde Vally MA may be used for projects taking place in House Mountain-Lowlands MA when the physical, biological, and cultural attributes of the project site match the characteristics described in this section.

water and riparian vegetation. Oak Creek, Sycamore Creek, West Clear Creek, Wet Beaver Creek, and the Wild and Scenic Fossil Creek emerge from deep cottonwood and mixed broadleaf lined canyons which cut into the Mogollon Rim and continue as ribbons of riparian vegetation across the Piñon-Juniper and Semidesert Grasslands before merging with the Verde River. Canyons along the Mogollon Rim show evidence of past flooding and are periodically flooded. Cool shady pools of water in and along the rivers provide an ideal setting for water-based recreation activities and a refuge from the dry hot landscape that surrounds them. Escarpments, rocky outcrops, and mesas provide a diversity of landforms and lead to unexpected changes in vegetation. Deciduous trees along riparian areas in the late fall provide some scenic benefits. Some of these riparian areas also have Arizona walnut, which contributes an interesting bark and texture against the winter sky and yellow fall color.

2 Recreation opportunities in the Verde Valley are abundant and cover a wide range of development levels. In some places, recreation on National Forest System lands are not discernibly different to the public than recreation on county and State managed public lands.

3 The prehistoric, historic, and settlement history of the Verde Valley is an integrated part of interpretive programs throughout the area. The relationship between the landscape of the forest and nearby national monuments is highlighted.

Sedona/Oak Creek

General Description for Sedona/Oak Creek Management Area

The Sedona/Oak Creek MA encompasses the Oak Creek Canyon, Sedona Neighborwoods, and House-Mountain Lowlands MAs. Unless explicitly stated, the direction in this management area applies to all three of the overlapping areas in addition to the direction listed under their section of the plan.

The Sedona/Oak Creek MA lies within Coconino and Yavapai Counties in Arizona. This management area encompasses all of Red Rock Country, Oak Creek Canyon, and the communities of Sedona and the village of Oak Creek. A variety of vegetation types can be found within the Sedona/Oak Creek MA, including riparian, grasslands, forest, and desert vegetation types.

This management area has a long history of human habitation and a remarkable natural environment rich with plants and wildlife. Unique features within this management area include: Oak Creek Canyon; Red Rock Secret Mountain and Munds Mountain Wilderness areas; Palatki, Honanki, and V-V Heritage Sites; Crescent Moon Ranch Cabin; hundreds of miles of recreation trails; the Red Rock All-American Road and Sedona/Oak Creek Scenic Byway; and the Wilson Mountain National Recreation Trail.

These desired conditions, objectives, standards, and guidelines from this management area also apply in addition to the Oak Creek Canyon, Sedona Neighborwoods, and House Mountain-Lowlands MAs plan direction.

Desired Conditions for Sedona/Oak Creek Management Area

MA-SedOak-DC

Scenery - Desired Landscape Character

1 The Red Rock Country surrounding Sedona provides a truly distinct landscape where monumental buttes, soaring multihued cliffs, fantastic towering spires, and rugged canyons bombard the eye and the senses, and vast sweeps of greenery refresh and inspire the spirit and fill the viewer with expectation. Unified by Oak Creek, the vital riparian link between the Mogollon Rim and Verde Valley, the landscape is a museum of life, a living crossroads connecting people in time and space. There is no other region on earth exactly like it. This landscape has long been celebrated nationally and internationally as a year-round destination. This management area is valued for its world renowned, high and very high scenic integrity, lush riparian areas and perennial streams, historic and prehistoric resources, and primitive and developed recreation experiences. The landscape is defined by bright and vibrant variations in color and form such as blue water and skies juxtaposed with red rocks and dark green trees. The rolling terrain in the piñon-juniper forest provides a variety of visual experiences and panoramic views of the rock formations. The contrast created between the red rocks and soil and the gray-green piñon-juniper forest enhances the visual character of the landscape in terms of color, texture, and form.

2 Scenic views from primary viewing areas such as highways, recreation sites, trails, and residential areas are maintained as natural and naturally appearing landscapes. High-quality opportunities are provided and maintained for people to enjoy the Red Rock's many scenic and aesthetic qualities including unaltered vistas of red rock cliffs.

3 From an aerial perspective, the landscape is coarse textured and has a vegetation pattern that varies from sparse to dense areas of trees and shrubs that range from dark evergreen to gray-green. The light red and reddish brown soil colors contrasts with the vegetation and rock outcrops to create a mottled appearance to the land surface. The large sandstone formations have a smooth appearance, with vegetation dotting the surface of the rocks in an irregular pattern.

4 With its intriguing human history and remarkable natural environment rich with plants and wildlife, Red Rock Country offers individuals and families the gifts of discovery, inspiration, and solitude. Elements of prehistoric agricultural landscapes and historic ranching are retained. When wandering the management area, the visitor is free to imagine, explore, and reconnect with the land. Clear, dark night skies are valued for stargazing and as a professional astronomical astronomy resource.

5 Some red rock formations are particularly distinctive such as Bell Rock, Cathedral Rock, and Courthouse Butte. Certain locations, such as Crescent Moon Ranch/Red Rock Crossing, Airport Mesa/Airport Saddle, West Fork of Oak Creek, Call of the Canyon, and Oak Creek Vista provide exceptional views of the red rock formations and are particularly valued by photographers, artists, and visitors. The area is rich in prehistoric and historic cultural landscapes, including ranches, orchards, cliff dwellings, and rock art and sacred sites. Along the escarpment that divides Red Rock–Secret Mountain Wilderness from the lower country, there are several notable cliff dwellings of high scenic and interpretive value such as Palatki and Honanki.

6 Riparian areas are a destination for fall color viewing. In summer, they offer a respite from heat along shady banks. In winter, snow-covered red rock is a strong feature. During the monsoon season in late summer, rainbows are common across the red rock sky.

7 Riparian areas, in particular Oak Creek, provide a lush dark green environment with perennial water, which begins in a narrow rich canyon and opens into Piñon-Juniper and Semidesert Grasslands. Interior Chaparral vegetation adds to the diversity and interest in the area.

8 Evidence of fire disturbance generally does not detract from visitor experiences.

9 Visitors are drawn to the Chapel of the Holy Cross for its distinctive architecture and for the panoramic vistas of the surrounding red rock landscape. From the adjoining Chapel of the Holy Cross plaza, one can see several prominent rock formations including Eagle Head Rock, the Two Nuns, and the Madonna and Child. To the Yavapai and Tonto Apache people, the Red Rock formations and canyons are recognized as the locations of legendary events that relate to their origins in the Verde Valley/Red Rock Country. The unique geology and local rock formations of Red Rock Country make it a multicultural landscape that has been recognized for centuries. The unique geology and local rock formations of Red Rock Country, combined with the distinctive architecture and historic significance of the Chapel of the Holy Cross, make it and the surrounding area a cultural landscape.

Developed Recreation

10 Day-use activities are emphasized across the management area, with a few campgrounds in the Oak Creek Canyon area. Facilities serve large numbers of people at main vista and trail access points, while sustaining the natural environment and protecting and providing views of outstanding scenery in an atmosphere where the natural environment prevails and opportunities exist for quiet and contemplation.

Dispersed Recreation

11 A variety of self-directed, day-use activities which emphasize trail use, scenic viewing, and learning about the natural and cultural history of the Sedona/Oak Creek ecosystem are encouraged. There is a range of nature and culturally-based recreation opportunities that provide a wide array of benefits by meeting people's needs and preferences while sustaining the Sedona/Oak Creek ecosystem. High-quality opportunities are provided and maintained for people to enjoy the red rocks' many scenic, aesthetic, and historic qualities. Recreation opportunities are primarily nature based, and they exist for individuals, families, or small groups. There are opportunities for experiencing solitude, scenic beauty, and natural quiet. Both short and long visits are available. National forest camping continues to be an important recreation experience.

12 Appropriate degrees of natural quiet are restored and maintained. Visitors have access to high-quality trail experiences designed for equestrians, hikers, and mountain bikers outside of wilderness and equestrians and hikers within wilderness. The area provides settings that support the strong demand for inspirational and contemplative benefits in the natural landscape. Most national forest visitor activities occur at developed sites and on trails designed for high levels of use. Some recreation sites and locations outside of wilderness receive high levels of use and meet the demands of day-use activities, emphasizing scenic viewing and trail use and experiencing and learning about the natural environment and cultural resources. Many locations provide an uncrowded setting. Roving and guided

interpretive activities are available in areas of high visitor use. Interpretation enhances the short duration, day-use experience with emphasis on orientation and natural history.

13 Many trails in this area provide easy to moderate recreation opportunities with well-defined trails and clear signage for easy way-finding.

14 Most national forest visitor activities occur at developed sites and on trails designed for high levels of use. Recreation site fees are maintained at an affordable level for families to access recreation opportunities in the Sedona and Oak Creek Canyon areas. Unneeded nonsystem trails are discouraged. Trails that duplicate system trails or cause damage—such as erosion or plant loss—are rehabilitated. A network of primarily nonmotorized trails provides opportunities at multiple development levels for hikers, OHV recreationists, mountain bikers, and equestrians while helping protect fragile natural resources and community relationships. Nonmotorized trails provide access to the landscape for the community, including people with disabilities.

15 In the Dry Creek Basin area, a variety of nonguided day-use recreational activities, featuring high-quality hiking, mountain biking, equestrian use, scenic viewing, contemplation, and opportunities to experience nature and solitude are available. Nonmotorized trail opportunities are available, providing a variety of challenge levels with emphasis on moderate to difficult access levels as defined in ROS accessibility guidelines.

16 Outstanding interpretive opportunities increase understanding of and appreciation for the management area with emphasis on geology, wildlife, plants, and natural history. Opportunities for contemplative reflection and scenic vistas for diverse visitors are provided, as well as access for older people and people with disabilities seeking opportunities for regenerative reflection.

17 Dispersed camping is limited to locations that protect resources, provide neighborhood security, and protect the national forest visitor's quality of experience.

18 Information directs visitors to places that can sustain visitor use.

19 Opportunities for wildlife viewing are available.

20 The setting and values of cultural resources of high public interest, such as Palatki and Honanki, are protected through limited encounters with other visitors.

21 A high level of interpretation and personal contact is provided at cultural interpretive sites. Onsite personnel and interpretation provides opportunities for: interactive learning through protection, documentation, and restorative stabilization projects at archaeological sites; appropriate access to site etiquette information; appreciation for native cultures and history; and visitor education about prehistoric and historic cultural resources that fully protects those resources. Full-time hosts are located at interpretive sites.

22 Most of the Sedona/Oak Creek MA is consistent with the applicable desired recreation settings. There are some inconsistencies in social encounters and road access that are recognized and expected to continue:

- Along Dry Creek Road, at or within half a mile of trailheads, where encounters with other people are expected to be high.
- Near to and access from private lands in the Sedona area, such as Cockscomb/Tree Farm/Long Canyon.

- Future development of State Highways 179 and 89A south of Sedona and manage for a rural ROS setting classification immediately adjacent to the roadway.
- Cultural interpretive sites like Palatki.
- The area influenced by Forest Road 152C.
- Scheurman Mountain, Carrol Canyon, and the Cathedral Rock area because of their small size and adjacency to urban and rural development.
- Parking, roadway, and staging sites on Schnebly Hill for social encounters and road access.
- Manage parking and staging areas at Broken Arrow Basin for roaded natural ROS settings because of the area's high level of use. The level of use on the main four-wheel-drive road is higher than generally desired for semiprimitive motorized (SPM) areas, but the physical setting and maintenance level of the road should be managed as SPM.

Motorized Recreation

23 A network of roads at various challenge levels is available for off-highway-vehicle touring. Most motorized recreation opportunities are within the House Mountain-Lowlands MA and Schnebly Rim, although opportunities may be available in other management areas. Recreation in Neighborwoods, Oak Creek Canyon, and areas between the communities of Sedona and Oak Creek and nearby wilderness is largely nonmotorized, except for Casner Powerline Road, Broken Arrow, and Soldier Pass.

Recreation Special Uses

24 New outfitter-guide permits are issued for activities that have demonstrated public need, promote transportation services or public safety, or substantially increase protection of cultural or natural resources.

25 Commercial tours emphasize opportunities to experience scenic beauty, natural quiet, and contemplative reflection. Activities that vary from this condition, such as motorized tours, do not impact the ability of other forest users to have these experiences.

26 Recreation events emphasize nature-based activities and education. Proponents are encouraged to stage large events off-forest and hold only smaller group activities on National Forest System lands.

Lands Special Uses

27 Facilities that provide access to or occur near the cliffs remain visually subordinate to the cliffs and to the surrounding landscape. Views of the cliffs from the travel corridors are enhanced or maintained through various means such as: limiting the use of intervening areas for parking, camping, and/or utilities; limiting motor vehicle traffic between access corridors and the cliffs; or acquisition of intervening private properties with emphasis on undeveloped parcels.

Facilities

28 Facility design and location retains and enhances the visitor's sense of arrival at a special place. Facilities are visually subordinate to cliffs and the surrounding landscape. Roadside

facilities are designed and placed to provide safe scenic viewing and photo opportunities. They blend with and complement the surrounding landscape.

Roads

29 Opportunities are provided for motorists to stop along main roads to view the spectacular scenery and experience Red Rock Country. Visitors see a landscape characterized by uncluttered panoramic vistas of scenic features. The sight of other roads is rare to the traveler. There are safe pullouts for motorists to stop along main roads to view the spectacular scenery and experience Red Rock Country.

30 Road densities, conditions, and locations within the Oak Creek watershed reduce impacts on the flood plain, peak flows, and sediment routing.

31 Some forest roads are in a rough condition that keeps the challenging and narrow character of the roadway but allows access by the careful driver in a standard low-clearance vehicle.

32 Road maintenance and road improvement activities are limited in order to conserve semiprimitive motorized ROS characteristics. Road maintenance is consistent with management area direction and ROS objectives.

33 Schnebly Hill Road maintains its semiprimitive character with an unpaved surface to promote slow to moderate vehicle speeds and the desired recreation character. Minimum standards for Schnebly Hill Road's width, horizontal and vertical alignment, vegetation clearing, ditch definition, and surfacing are maintained. Improvements to Schnebly Hill Road as an alternative commuter route between Interstate17 and Sedona are discouraged in order to maintain a more primitive roadway and recreational experience. The character of development and use remains low key, unhurried, and rustic; vehicle traffic speed is consistent with this character.

Ecological

34 The biological, physical, and human elements of the landscape sustain ecological processes, functions, and structures within a natural range of variability and conditions appropriate to the Sedona/Oak Creek ecosystem. Natural ecosystem disturbance patterns are conserved or restored consistent with human health and safety.

Heritage Resources

35 Stabilization and conservation programs are implemented at damaged sites. Unofficial trails that lead to archaeological sites are eliminated to protect sites from damage.

Community

36 Harmony exists between residents and visitors. Residents have a sense of security concerning National Forest System lands directly adjacent to residential development.

37 The community shares the forest's stewardship goals. Community members understand their stake in ecological health and collaborate in national forest decisions that are mutually beneficial to the national forest and the community.

Objectives for Sedona/Oak Creek Management Area

FW-SedOak-O

Dispersed Recreation

1 Within 10 years of plan approval, develop Schnebly Hill Vista as a viewpoint, interpretive site, and possibly a trailhead.

Standards for Sedona/Oak Creek Management Area

MA-SedOak-S

Developed Recreation

1 Prohibit dogs at developed heritage interpretive sites.

Motorized Recreation

2 Allow four-wheel-drive use along the Casner Powerline access road through a special use permit system consistent with ROS goals and adjacent wilderness, wildlife objectives, soil protection, and where such use does not interfere with APS powerline access needs.

3 Due to limited space, four-wheel-drive groups are not allowed to camp along the Casner Powerline Road between the two gates.

Recreation Special Uses

4 Do not permit commercial tours on Casner Powerline Road.

5 Do not permit new outfitter-guide permits in areas that are at or approaching capacity.

Lands Special Uses

6 Allow plant collection for commercial activities only in the House Mountain-Lowlands MA of the Sedona/Oak Creek MA, except for the legitimate purposes of federally recognized tribes.

Land Adjustments

7 Land exchanges that dispose of national forest land in the Sedona/Oak Creek MA will occur only if they result in acquisition of national forest lands in the Sedona/Oak Creek MA.

8 Land exchanges that dispose of national forest land in The Dells area will occur only if they result in acquisition of high priority private parcels elsewhere in the Sedona/Oak Creek MA. High priority private parcels total approximately 95 acres (see appendix A, map 13). High priority land acquisition parcels include: Lincoln Canyon (25 acres) and Hancock Ranch (70.3 acres).

9 Base-for-exchange lands are national forest lands located at: Chapel of the Holy Cross area (approximately 11 acres, Sedona Neighborwoods MA), Slide Rock area (approximately 13 acres, Oak Creek MA), Village of Oak Creek Golf Course area (approximately 5 acres, Sedona Neighborwoods MA), and The Dells area (up to 300 acres, Sedona/Oak Creek and House Mountain-Lowlands MAs).

10 Base-for-exchange lands at the Chapel of the Holy Cross area is intended for church acquisition only; base-for-exchange at Village of Oak Creek Golf Course is intended for golf course acquisition.

Forest Products

11 Removal of commercial national forest products is by permit at designated locations only.

Guidelines for Sedona/Oak Creek Management Area

MA-SedOak-G

Scenery

1 Natural landforms and vegetation should be used, to the extent possible, to screen facilities from important viewing locations such as scenic trails and byways.

2 The scenic integrity objective for public utilities should be no less than moderate when viewed from Concern Level 1 and 2 travelways.

Dispersed Recreation

3 Trails and trailheads should be installed so they do not impact rare and sensitive plant populations, such as Verde Valley sage and rare agaves.

4 Existing camping and campfire restrictions for the Dry Creek Bain, special areas, and near roadways and neighborhoods should be maintained to protect property and unique resources.

5 Although the ROS objectives at Palatki and Honanki are the same as those of the surrounding management area, the maximum desired number of encounters is three to four groups[56] per hour because of the lower capacity of these sites to handle visitation without damage to cultural values.

Motorized Recreation

6 A consistent design style should be used for interpretive and information signs and kiosks but also allow for individual site distinctiveness.

7 Vehicle crossings of Dry Creek should be prohibited unless appropriate water quality protection measures can be implemented.

8 Vehicular access to Oak Creek should be restricted by measures such as vehicle barriers.

9 Roads should be maintained at the lowest standard possible consistent with safety and the desired recreation experience.

Recreation Special Uses

10 Any statewide special use permits for the Sedona/Oak Creek MA should be issued by the Red Rock Ranger District. This will ensure compatibility with plan direction and appropriateness of the activity for the sensitive Sedona/Oak Creek MA.

11 Objectives[57] for social encounters[58] should be as outlined below in table 13 unless otherwise described under desired conditions for this management area.

[56] A group is defined as six or fewer people.

[57] Objectives are for typical conditions in an area or on a road or trail. Typical conditions should capture the majority of the days or hours during the peak season.

[58] An encounter is defined as one vehicle or six or fewer people. For example, if you pass a group of 14 on the trail that would equal 3 encounters; if you pass 2 jeeps, that would equal 2 encounters.

Table 13. Objectives for social encounters in the Sedona/Oak Creek Management Area

ROS Setting	Social Encounters
Rural	No more than 15 per hour for Forest Service permitted commercial tour operations only. All other users are moderate to high contact frequency.
Roaded Natural	No more than 15 per hour for Forest Service permitted commercial tour operations only. All other users are moderate to high contact frequency.
Semiprimitive Motorized	No more than 15 per day for all users (commercial tours and self-guided).
Semiprimitive Nonmotorized	No more than 15 per day for all users (commercial tours and self-guided).
Semiprimitive – Wilderness or Primitive – Wilderness	No more than 15 per day for all users (commercial tours and self-guided)
Pristine	NA

[1] These objectives are not plan objectives.

Lands Special Uses

12 Commercial filming using aircraft should not be allowed in the Sedona/Oak Creek MA except within the House Mountain-Lowlands MA and along paved highways.

Land Adjustments

13 Priority parcels in the Sedona/Oak Creek Management Area[59] should be acquired from willing sellers through methods other than land exchanges, when possible.

14 National forest parcels less than or equal to 10 acres in size in the Sedona/Oak Creek MA could be disposed of under the Small Tracts Act of 1983 (P.L. 97–465), Townsite Act of 1958 (P.L. 85–569), or General Exchange Act of 1922 (U.S.C. 16 485,486) to resolve encroachment issues or provide lands needed for public purposes.

15 Slide Rock base-for-exchange land should be available for acquisition by Slide Rock State Park to better facilitate management of the creek and park.

(For land adjustment guidelines for the Sedona/Oak Creek MA, see forestwide direction on page 95.)

Roads

17 In areas where motorized recreation is emphasized (particularly semiprimitive motorized), roads should be maintained in the lowest standard possible consistent with safety and the desired primitive recreation experience.

18 Dry Creek Road (Forest Road 152) should be maintained in a rough condition that keeps the challenging and narrow character of the roadway but allows access by the careful driver of a standard low-clearance vehicle as a method of retaining the semiprimitive character of the lands being accessed from the road.

[59] Priority parcels are those listed in the standards and guidelines for the Sedona/Oak Creek MA.

19 Miles of road should be reduced to the minimum roads required for public access and management, and remaining roads should be located so that, except for road junctions, the sight of other roads is rare to the traveler.

20 Scenic parkway characteristics should be maintained, including roadway features such as signs, guardrails, and landscaping, that contribute to the desired scenic character.

21 Parking and access areas should be strategically located to minimize disturbance and visual clutter associated with signage, parking areas, and trailheads.

Management Approaches for Sedona/Oak Creek Management Area

Recreation Special Uses

Develop partnerships with outfitter-guides for Schnebly Hill Road and other roads and facilities that receive high use by commercial tour activities for the purpose of maintaining and protecting resources in these areas.

Provide a commercial guide training program. Such training should focus on national forest goals and regulations, Leave No Trace etiquette, and natural and cultural history. Training should occur annually or when new guides are hired. Collaborate with guides, where possible, to develop and implement the training program.

Work with local and regional governments and road agencies to develop transportation solutions that reduce traffic and vehicle impacts at high impact recreation areas on the forest.

Collaborate with Federal Aviation Administration, Sedona Airport Administration, and air tour operators to minimize aircraft effects on threatened, endangered, or sensitive animal species, particularly over suitable peregrine falcon nesting habitat and big game wintering habitat.

Roads

Develop partnerships with commercial tours for maintaining Schnebly Hill Road and other roads and adjacent facilities used for commercial tour activities.

Dispersed Recreation

Collaborate with Arizona State Parks to better meet visitor needs and protect resources in the vicinity of Slide Rock State Park, Deadhorse State Park, and Red Rock State Park.

Methods of creating and maintaining user-friendly trails include: providing well-defined trails that encourage people to stay on designated routes, providing orientation maps, designing trails that provide a reasonable degree of access, and having trail markers and defining trail edges.

Community

Collaborate with local governments, agencies, and residents to protect resources and address residents' concerns.

Sedona Neighborwoods

General Description for Sedona Neighborwoods Management Area

The Sedona Neighborwoods MA is a submanagement area of the Sedona/Oak Creek MA. In addition to the direction for the Sedona/Oak creek MA, the direction in this section applies. The desired conditions for scenery from Sedona/Oak Creek and Oak Creek Canyon MAs may also apply to the Sedona Neighborwoods MA if the site being analyzed at the project level fits the landscape character described for those management areas[60].

The Sedona Neighborwoods MA is known as "Sedona's Backyard" as it is next to many residential areas, urbanized sections of Sedona and the Village of Oak Creek, sections of State Highways 170 and 89A, and a several mile stretch of Oak Creek south of Sedona. The boundaries of Red Rock-Secret Mountain Wilderness from Capitol Butte to Steamboat Rock form the MA's northern perimeter. This MA is heavily used by visitors and residents who cherish the natural landscape so close to Sedona and frequently use the honeycomb of trails.

Desired Conditions for Sedona Neighborwoods Management Area

MA-SedN-DC

Scenery

1 Natural landscape is highly valued by local residents and visitors. National Forest System lands provide the backdrop for the community's character while accommodating features that are more typical of an urban or rural setting. Infrastructure and developments that serve a broad public interest are sometimes evident but still subordinate to the landscape. Recreation developments contribute to the area's unique sense of place through use of native and naturally appearing materials; mimicking line, form, color, and texture of the surrounding landscape; or use of identifiable Forest Service symbols and historic features.

Dispersed Recreation

2 Relatively quiet, easily accessed national forest supports wildlife, scenic viewing, and experiencing nature. A system of trails and pathways surrounds the city of Sedona and the village of Oak Creek and provides trail recreation opportunities and a means of nonmotorized travel off busy streets. Damaged recreation sites are restored, with priority given to sites adjacent to Sedona and the village of Oak Creek. Local neighborhood concerns about the impacts of visitor use on residential quality of life are addressed by a variety of methods, including nighttime closures, improving signs, and limiting motorized access and the number of visitors. Volunteer partnerships have high resident participation and provide opportunities for exciting stewardship with a strong learning component.

Recreation Special Uses

3 Special use activities that access National Forest System land through neighborhoods address resident concerns for safety and minimize disturbance. Mitigations are identified in the authorized operating plans.

[60] This means that the specialist could be working on a project in the Sedona Neighborwoods MA but looking at scenery that more closely matches the landscape character of the Oak Creek Canyon MA or for the Sedona/Oak Creek MA depending on the physical, biological, and cultural attributes of the viewshed. In those cases, the scenery desired conditions from the management area that best matches the setting should be applied.

Standards for Sedona Neighborwoods Management Area

MA-SedN-S

1 Camping and campfires are prohibited in the Sedona Neighborwoods MA except in designated places.

Guidelines for Sedona Neighborwoods Management Area

MA-SedN-G

Dispersed Recreation

1 To minimize traffic impacts to local residents, access at neighborhood national forest trailheads should be managed to discourage visitor parking along residential streets and to encourage alternative forms of transportation.

Management Approaches for Sedona Neighborwoods Management Area

Strong community partnerships for stewardship of "Sedona's backyard"' support resident health, safety, and quality of life.

Dispersed Recreation

Collaborate with the Arizona Game and Fish Department (AZGFD) to educate residents about urban wildlife such as deer, snakes, raccoons, skunks, and coyotes. Special hunting and shooting regulations should be developed collaboratively with the AZGFD, Yavapai and Coconino County Sheriffs, and City of Sedona Police Department.

Use the "Redrock Trails Plan" and the "Sedona Urban Trails and Pathways Plan" (City of Sedona, 1996) as guides for future trail planning efforts. (Refer to map 6 in the Redrock Trails Plan.)

Expand partnerships with neighborhoods to promote trail and resource stewardship and to obtain assistance in trail maintenance and planned trail construction.

Recreation Special Uses

Work with commercial operators, filming groups, and homeowners to resolve safety and quality of life conflicts such as concerns about noise, safety, and facilities maintenance needs.

Oak Creek Canyon

General Description for Oak Creek Canyon Management Area

The Oak Creek Canyon MA is a submanagement area of the Sedona/Oak Creek MA. In addition to the direction for the Sedona/Oak Creek MA, the direction in this section applies. The desired conditions for scenery from this management area may also apply to the Sedona Neighborwoods MA if the site being analyzed at the project level fits the landscape character described for this management area[61].

[61] Scenery desired conditions for the Oak Creek Canyon MA may be used for projects taking place in the Sedona Neighborwoods MA when the physical, biological, and cultural attributes of the project site match the characteristics described in this section.

The Sedona area was settled by several families in the late 1870s to1880s. Travel at that time was limited to horse trails. The first wagon road in Oak Creek Canyon was built along Oak Creek below Indian Gardens by pioneer Jim Thompson between 1876 and 1887. By 1930, the highway through Oak Creek Canyon was completed to provide easy transportation for campers, tourists, and fisherman lured by the trout stocked into Oak Creek. This stretch of State Highway 89A was formally designated as a scenic byway by the Arizona Department of Transportation on August 24, 1984. Oak Creek has been designated as an unique Arizona waterway.

Desired Conditions for Oak Creek Canyon Management Area

MA-OakCrk-DC

Scenery – Desired Landscape Character

1 The centerpiece of the canyon is the sparkling cool creek and the magnificent scenery as viewed along a winding two-lane highway that provides an eclectic setting with a wide variety of ecological niches among wilderness and interspersed with several pockets of developed private land. The elevation change within the canyon spans from ponderosa pine to piñon-juniper scattered among red and white sandstone cliffs and steep drainages. Basalt cap rocks, black talus slopes, rockslides, and large rockfall boulders overlying the older sedimentary formations expose the diverse geology and provide visual interest. Within these changes is wide variety of riparian vegetation, fir, and oak components. This diversity provides outstanding fall colors and the mix of deciduous and coniferous vegetation creates a unique winter landscape of snow, cliffs, and running water.

2 Remains of the historic homesteading activity are present in some locations including old cabins, irrigation ditches, fruit orchards, wooden water lines, trash dumps, and old roadbeds and contribute to the unique sense of place.

3 When treated for safe evacuation of Oak Creek Canyon, mid-slope Interior Chaparral has openings of a size and pattern that deviates from the desired landscape character but are not noticeable to visitors driving on the highway or traveling on trails.

Recreation

4 Oak Creek Canyon is an area of contrasting recreation settings, ranging from heavily used highway to highly developed recreation sites and resorts to primitive trails. Visitation at Oak Creek Vista is primarily for short duration, emphasizing interpretation and orientation to Oak Creek Canyon and Red Rock Country. Developed day-use areas and camping are present along Oak Creek Canyon. Recreation sites along Oak Creek are managed to protect soil condition and riparian vegetation and maintain water quality. Damaged sites are restored.

5 Visitors feel welcomed to Oak Creek Canyon and know where to go to enjoy the activities they seek. They sense that they are entering a special location with unique and remarkable characteristics. Visitor information services emphasize interpretation and orientation to Oak Creek Canyon and Red Rock Country.

6 Campfire smoke in Oak Creek Canyon is minimal to protect habitat conditions for bats, birds, and other wildlife species, and to improve air quality. The contribution of recreation users to air pollution (e.g., visibility and particulate matter) in Oak Creek Canyon is limited through such methods as requiring campers to burn only dry wood, prohibiting wood gathering, and prohibiting campfires at certain times.

7 Trails in Oak Creek Canyon allow for creek access while protecting the riparian community, wildlife habitat, and sensitive plants. Opportunities for interpretive trails and walking exist. Historic trails that access the rim of Oak Creek Canyon, such as Telephone, Purtyman, Harding Springs, Cookstove, Thomas Point, Thompson Ladder, and Casner Trails, are maintained even though parking may be limited for resource protection. The number of encounters on the north side of Oak Creek will be higher than the south, nonroaded side.

Lands Special Uses

8 Research, educational research, and educational activities are consistent with resource protection and recreation experience goals.

Transportation

9 Development and parking in Oak Creek Canyon is limited to minimize resource impacts. Private vehicle traffic and parking are minimized, while also considering scenic quality and safety. Alternative modes of transportation that reduce automobile dependency and traffic congestion are encouraged. The level of private recreation traffic in Oak Creek Canyon is consistent with a high quality recreation experience.

10 Trails and recreation use are located and managed to reduce impacts of woody riparian vegetation and riparian habitat in Pumphouse Wash.

Standards for Oak Creek Canyon Management Area

MA-OakCrk-S

1 Camping and campfires are prohibited in the Oak Creek Canyon MA except in designated places.

2 Forest products are only removed from the Sedona/Oak Creek MA for commercial use when authorized by permit and collected in designated areas.

Guidelines for Oak Creek Canyon Management Area

MA-OakCrk-G

1 Methods such as placing toilets in strategic locations, providing information about proper sanitation practices, installing shower and hand-washing facilities, and providing gray water disposal sites should be used to reduce recreation impacts on water quality.

2 To protect water quality and recreation settings, minerals materials operations should be limited in the Oak Creek Canyon MA, although some activities may be appropriate for the Arizona Department of Transportation and Forest Service administration needs if they are minor and consistent with area desired conditions, standards, and guidelines.

3 Road and trail rehabilitation work should be focused in the steep drainages—such as Pumphouse Wash—that flow into Oak Creek Canyon and contain fragile plants and rare species.

Management Approaches for Oak Creek Canyon Management Area

Work with the Arizona Department of Transportation to block off unsafe parking adjacent to the road and to maintain a high standard of scenic quality in signage.

Develop a rock climbing management strategy for the Oak Creek Vista area that addresses climbing needs, visitor safety, and resource protection.

Encourage the use of native construction materials along the State scenic road.

Work with the Arizona Department of Environmental Quality to maintain the creek's status as a "unique water."

Partner with Slide Rock State Park to manage recreation and scenic resources.

House Mountain-Lowlands

General Description for House-Mountain Lowlands Management Area

The House Mountain-Lowlands MA is a submanagement area of the Sedona/Oak Creek MA. In the 1987 plan, the area was called the Savannah MA. All direction for the Sedona/Oak Creek MA applies to the House Mountain-Lowlands MA. There are two prohibited or limited activities in the Sedona/Oak Creek MA that are permitted within the House-Mountain Lowlands MA, per the following standard and guideline:

- **MA-SedOak-S-6:** Allow plant collection for commercial activities only in the House Mountain-Lowlands MA of the Sedona/Oak Creek MA, except for the legitimate purposes of federally recognized tribes.
- **MA-SedOak-G-12:** Commercial filming using aircraft should not be allowed in the Sedona/Oak Creek MA except within the House Mountain-Lowlands MA and along paved highways.

The desired conditions for scenery from the Sedona/Oak Creek and Verde Valley MAs may also apply to the House-Mountain-Lowlands MA if the site being analyzed at the project level fits the landscape character described for those management areas[62].

Desired Conditions for House Mountain-Lowlands Management Area

MA-HouseMtn-DC

Dispersed Recreation

1 Low-density human uses occur, including scenic viewing, OHV touring, hunting, wildlife viewing, and firewood cutting. A wide variety of semiprimitive motorized and nonmotorized trail uses are provided.

Roads and Facilities

2 There are few roads in the House Mountain-Lowlands MA. Existing roads are primitive, with only native surfacing and no road prism development. Facilities are few and the character of development is rustic and primitive.

[62] This means that the specialist could be working on a project in the House Mountain-Lowland MA but looking at scenery that more closely matches the landscape character of the Sedona/Oak Creek MA or for the Verde Valley MA depending on the physical, biological, and cultural attributes of the viewshed. In those cases, the scenery desired conditions from the management area that best matches the setting should be applied.

Guidelines for House Mountain-Lowlands Management Area

MA-HouseMtn-G

Roads

1 Roads should be located to maintain adequate cover for animal shelter and foraging between roads, especially in locations with high road densities.

2 Only native surfacing should be used, and road prism development should not be used for lateral roads (i.e., off of main access roads) unless increased use and development of private property require improvement for resource protection.

Special Areas

Designated Wilderness Areas

See appendix A, map 17.

General Description for All Designated Wilderness Areas

There are 10 existing wilderness areas on the Coconino NF. This plan provides direction for eight of them. Direction for the Kendrick Mountain and Mazatzal Wilderness areas is provided in the Kaibab and Tonto National Forests' plans, respectively. This ensures consistent management of these wilderness areas across forest boundaries. The Coconino NF's plan contains direction for Sycamore Canyon Wilderness, which also lies within the Prescott and Kaibab National Forests.

Desired Conditions for All Designated Wilderness Areas

SA-Wild-All-DC

1 Wilderness and recommended wilderness areas provide their full range of social and ecological values for which these areas were recognized with special status.

Wilderness Recreation

2 Trail and trailhead development emphasizes wilderness recreation and watershed condition while maintaining wilderness resource values. Key wilderness trailheads provide sanitation, orientation, and interpretation to wilderness visitors. Directional guidance and information on minimum impact and archaeological site etiquette is provided at wilderness access points. Loop hikes are expanded in wilderness to encourage low-impact day use, where possible. Wilderness dependent recreation opportunities, such as backpacking, horse packing, and hunter guiding, are ongoing and trailheads provide appropriate facilities for them where these activities are consistent with resource and recreation opportunity setting objectives.

3 New structural improvements are rare and only constructed when necessary for proper management and/or protection of the wilderness resource. High traffic roadside facilities that provide a gateway to wilderness areas or vistas of wilderness inform and educate visitors about wilderness.

4 Permanent damage to the resource is limited by distributing visitor use in wilderness by permit system or other methods, where such damage is evident. Existing signs and facilities are maintained where public safety and resource protection require it.

5 Places within existing wilderness that have inconsistencies with the wilderness primitive character, such as at Bell Rock, West Fork, Boynton Canyon, Humphreys Trail, and some places near private land retain wilderness values to the extent possible. Infrastructure in these places is more developed and signs and cairns (i.e., trail markers made of stacked rocks) may be more frequent than normally associated with wilderness management to protect visitor experience and resources. In areas where the desired condition is a pristine or primitive wilderness opportunity, these types of developments do not exist.

6 Special use permits issued in wilderness provide for activities that facilitate protection of the wilderness character. These permitted activities do not interfere with the challenging and self-reliant recreation of other wilderness visitors and do not cause widespread negative impacts to wilderness character.

7 Wilderness recreation opportunity settings are maintained, recognizing several inconsistencies (with primitive) such as at Bell Rock, West Fork, Boynton Canyon, Humphreys Trail, and some places near private land.

Wilderness Education

8 Educational material and information is provided at all wilderness trailhead access points including information about the variety of trails and experiences available in nearby wilderness areas and information about personal safety, “Leave No Trace” etiquette, and pertinent regulations. Educational materials encourage widespread understanding of the philosophy of wilderness and support for its natural and social benefits. They also provide information to help users be prepared with appropriate equipment and information. Visitors learn about sensitive ecological features, know their responsibility, and act in a way that protects ecological systems.

Ecological Management of Wilderness Areas

9 Ecosystems within wilderness are functioning within their historic range of variability. Ecological conditions trend toward the desired conditions for the respective vegetation types within each wilderness. Other ecological features (e.g., biophysical features, geological resources, aquatic systems) achieve or are trending toward their desired conditions. Native species are present and supported by properly functioning habitat conditions. Disturbances, including fire and flooding, are able to play their natural role in vegetative succession, while accounting for public health and safety concerns. (For more information, see the direction in the forestwide ecological sections, including the appropriate vegetation types). Ecological conditions trend toward the desired conditions for the respective ecological resource within each wilderness. Invasive plants and animals do not occur at levels that disrupt ecological functioning. Plants used for traditional medicine and cultural purposes thrive here.

Objectives for All Designated Wilderness Areas

SA-Wild-All-O

1 Annually, rehabilitate one to five wilderness sites or areas that have been impacted by recreation in order to restore wilderness character.

Standards for All Designated Wilderness Areas

SA-Wild-All-S

1 In wilderness, group size limit is 12 persons and livestock (combined) per group, except for wilderness based education events under special use permit.

2 Commercial activity is not permitted in wilderness areas, unless the activity is wilderness dependent and the activity cannot be conducted or replicated outside of wilderness. This would include activities by organizational groups and/or training classes.

Guidelines for All Designated Wilderness Areas

SA-Wild-All-G

1 In order to maintain visitor experiences of solitude, large group activities (75 or more people) under special use permit, such as races and outdoor retreats, should not occur in wilderness unless they are specifically for the purpose of wilderness-based education and are designed to protect wilderness resources.

2 Signage in wilderness should be limited to those that are essential for resource protection and user safety to retain the wilderness experience of self-reliance and challenging recreation.

3 Trails should be designed to discourage bicycle access into adjacent wilderness and to otherwise minimize impacts on wilderness.

4 Signage and parking for wilderness access should concentrate parking in designated locations in order to provide appropriate visitor information. Casual wilderness use resulting from roadside parking along the highway should be discouraged in order to prevent social trails from being developed. Damaged parking sites should be restored using erosion control and revegetation to remove evidence of resource impacts.

Management Approaches for All Designated Wilderness Areas

Implement corrective measures including, but not limited to, a wilderness permit system if overuse causes unacceptable resource damage. Overuse can be determined from: limits of acceptable change studies, range analyses, code-a-site inventories, or professional judgment. The Kachina Peaks, Red Rock-Secret Mountain, Wet Beaver, West Clear Creek, and Sycamore Canyon Wilderness areas may be closely monitored to determine whether or not corrective measures are needed.

Enforce the prohibition against bicycles in wilderness through methods such as ranger patrols, placement of bike racks near wilderness boundaries or portals, “wilderness ahead” signs located outside of the wilderness, improved trail design, and expanded trail opportunities outside of the wilderness.

Provide regular wilderness ranger patrol in wilderness areas to the degree necessary to meet the levels of acceptable change or other appropriate standards for each area. If funding is limited, use volunteers to accomplish as much of this work as possible via the Wilderness Information Specialist (WIS) program. Standard level trail maintenance is defined in the implementation schedules for each wilderness.

Expand partnerships such as the resort Wilderness Ranger Program to increase awareness of wilderness values and etiquette. Increase residents' awareness of the wilderness near them by providing them with information about wilderness. Use volunteers as much as possible, particularly during peak season to patrol, pick up litter, break up fire rings, restore damaged sites, contact the public, and maintain trail condition logs.

Coordinate law enforcement activities with wilderness managers to ensure that any evidence of illegal activities is removed.

Develop wilderness management direction that establishes limits of acceptable change for all wilderness areas.

Management plans may be developed and implemented for all wilderness areas on the forest.

Coordinate with the Arizona Game and Fish Department on management of native species within wilderness per the current memorandum of understanding (Forest Service, 2006b).

Fossil Springs Wilderness

General Description for Fossil Springs Wilderness

Sixty miles south of Flagstaff, the Fossil Springs Wilderness encompasses a steep, wide canyon approximately 1,600 feet down at the edge of the Mogollon Rim. Generally, the vegetation types are Piñon-Juniper Evergreen Shrub, Riparian, and Ponderosa Pine; however, there are inclusions of other types due to the topographic and ecological complexity of the area. This wilderness is one of the most diverse areas in the State likely due to the range of plant communities compressed into a small area that ranges from very wet to very dry. The creek is situated in a region dominated by Late Paleozoic sedimentary rocks underlying basalt flows. The springs are located on the southern side of the wilderness, but are not within the wilderness. Calcium carbonate within the stream precipitates chemical mineral deposits called travertine on rocks and sediments in the stream channel. These deposits along with the unique stream chemistry interact with the riparian vegetation and other geological features to produce an unusual environment that is only one of two in Arizona. (See the direction for the Fossil Springs Botanical Area and Wild and Scenic Rivers for more discussion of the springs.) Fossil Creek has a wild river segment and a recreational river segment within the wilderness. (See the direction for Wild and Scenic Rivers and the "Fossil Creek Comprehensive River Management Plan" for more information.)

Fossil Creek is a very important place for the Apache. There are many stories and traditions about the canyon and the role it has played through time as a sanctuary for the Apache people. In the 1870s, most Apache were forcibly relocated to the San Carlos Reservation, although some families managed to hide out and survive in the canyon. With the need for labor to construct the Childs-Irving hydroelectric power plant system, Apache returned to the canyon to help build that historic project and maintain it for over 40 years until they were forced to leave and relocate to the Yavapai-Apache Reservations by Camp Verde, Middle Verde, and Clarkdale.

The desired conditions for this area are in addition to those described for the Verde Valley MA.

Desired Conditions for Fossil Springs Wilderness Area

SA-Wild-Fossil-DC

1 The area retains its integrity as an outstandingly clean, pristine site, has primitive hiking trails, and is a good place to find solitude. There are recreation opportunities for big and small game hunters, wildlife and plant viewing, hikers, backpackers, fishermen, swimmers, and kayakers.

2 The steep canyon topography has terraces which provide for a greater diversity of plants and habitat conditions. The vegetation types for this wilderness include Piñon-Juniper Evergreen Shrub, Mixed Broadleaf Deciduous Riparian Forest, and Ponderosa Pine (see the desired conditions for these vegetation types for more information). Within these vegetation types there are numerous and diverse inclusions of communities of plants such as mesquite, catclaw acacia, crucifixion thorn, cacti, ash, walnut, alder, cottonwood, sycamore, hackberry, willow, chokecherry, boxelder, piñon pine, several juniper species, and ponderosa pine dominating the higher plateaus with numerous annual and perennial woody and nonwoody plants. A variety of age classes of riparian trees are present, successfully regenerating, and some trees are very large (exceeding 30 inches in diameter). Native shrubby and herbaceous vegetation is also successfully regenerating and provides food and cover for wildlife consistent with the capacity of the area. This vegetative diversity creates many wildlife niches for deer, javelina, and a large number of bird species. Occupied black hawk nesting sites are protected from disturbance during the breeding season.

3 Hydrologic and geologic features of the stream are preserved, especially the travertine system. Water quality is outstanding and the river at times appears blue because of the water chemistry. Turbidity is low except during flood events, and *E. coli* levels are low. The exposure above the springs of a scarp of the Mogollon Rim, eroded in Late Paleozoic sedimentary rocks and now buried under extensive Tertiary basalt lava flows, is preserved in pristine geological condition. In the uplands, the landscape is dry and open with a very rocky texture and semiarid vegetation.

4 Historical trails and features heighten the wilderness experience of visitors. Mail Trail, once used for horseback mail deliver, and Flume Trail have interpretation appropriate to a wilderness setting that ties to the history of hydropower and industry in the vicinity. Native settlement and culture are another highlight of the wilderness experience in this area. Fossil Creek is notable for its high archaeological site density and diversity in a unique microcosm in the Mogollon Rim. It is also one of the more important locales of historic and modern Apache occupation. The various archaeological site types that occur in the different environments in and around Fossil Creek reflect specialized subsistence and settlement strategies to maximize the specific resources of those environments. In this respect, there is also similarity in the ways the prehistoric Sinagua and historic Apache utilized the Fossil Creek area. Habitations and riparian-oriented agriculture were the main uses of the canyon bottom and virtually every flat location along the creek shows evidence of habitation by both Sinagua and Apache. The hill slopes along the creek were areas extensively utilized for the collecting and gathering of wild plant foods such as yucca, agave, and prickly pear which were cooked in large communal roasting pits. Small pockets of soil that collected in hillsides formed small areas in which corn could be grown, as evidenced by numerous small prehistoric field houses as well as remains of Apache houses in their vicinity.

Kachina Peaks Wilderness

General Description for Kachina Peaks Wilderness

Located just north of Flagstaff, Kachina Peaks Wilderness is part of a large, heavily vegetated composite volcano known as the San Francisco Peaks. The San Francisco Peaks range in elevation from 7,400 to 12,633 feet high and includes Humphreys Peak, the highest point in Arizona. The San Francisco Peaks exhibit a rich diversity of past geologic events such as lava flows, volcanic eruptions, glaciation, and erosion. The San Francisco Peaks are an outstanding example of past volcanic activity and preserve the best example of Ice Age glaciation in Arizona in lateral and medial moraines and former streambeds.

The only Alpine Tundra vegetation in Arizona is found on the San Francisco Peaks. This area is less than 1,000 acres and contains a threatened plant, San Francisco Peaks ragwort, as well as other endemic and threatened species. Wildlife species include mule deer, elk, turkey, black bear, coyote, mountain lion, red squirrel, and Clark's nutcracker. The San Francisco Peaks contain virgin spruce-fir forest and the only area of bristlecone pine on the Coconino NF. The San Francisco Peaks are sacred to a number of southwestern tribes, most notably the Hopi and Navajo, but also the Yavapai, Walapai, Havasupai, Apache, Zuni, and Acoma (see San Francisco Peaks MA).

This wilderness contains the San Francisco Peaks Research Natural Area, which provides a control or reference for an Alpine Tundra ecosystem at the southern extend of this ecosystems range.

For scenery desired conditions, see the San Francisco Peaks MA.

Desired Conditions for Kachina Peaks Wilderness

SA-Wild-KPeaks-DC

1 There is a diverse composition of wildlife species and native vegetation. In this high elevation wilderness, there are Alpine Tundra, Mixed Conifer with Aspen, and Spruce-Fir forests with Subalpine Grasslands and Ponderosa Pine interspersed (see the desired conditions for these vegetation types for more information). The ecosystem diversity of the wilderness and ecological attributes and processes that allows it to provide watershed values, habitat for native biota, panoramic vistas, and/or solitude are maintained. Recreation use and ecological functions retain the tribal values and the unique attributes of the alpine vegetation.

2 The alpine ecosystem provides habitat for San Francisco Peaks ragwort, is able to support and sustain rare or endemic species, and continues to be resilient to natural and human-caused impacts.

3 Several roads, jeep trails, and hiking/equestrian trails provide access to the wilderness boundary. Recreational opportunities include day hiking, backpacking, cross-country skiing, snowshoeing, winter camping, snow and ice climbing, small and big game hunting, bird watching, and leaf watching (fall). The top of Kachina Peaks Wilderness provides outstanding views of the Painted Desert, North Rim of Grand Canyon, and Sunset Crater. Trails to the top of peaks within the wilderness are higher traffic than is typical of more remote wilderness. These trails have a stable narrow width and discourage traveling off trail. Particularly in areas of Alpine Tundra vegetation, off-trail travel does not occur. The

mountain maintains attributes that provide historic and cultural values such as shrines. There may be inconsistencies with social encounters associated with the wilderness recreation opportunity spectrum on the Humphreys Trail year round and near the Snowbowl Ski Area in winter.

Standards for Kachina Peaks Wilderness

SA-Wild-KPeaks-S

1. Off-trail travel is prohibited, except when there is enough snowpack to protect underlying vegetation, particularly in the Alpine Tundra vegetation type.
2. No horse or pack stock use above timberline.
3. No overnight camping above timberline.

Munds Mountain Wilderness

General Description for Munds Mountain Wilderness

Elevations in the Munds Mountain Wilderness range from 3,600 to 6,800 feet. Located east of Sedona, the area is characterized by the moderate to steep slopes of the Mogollon Rim. Rattlesnake, Woods, and Upper Jacks Canyon are the major drainages. Munds Mountain, Lee Mountain, and Horse Mesa are the areas of highest elevation.

Munds and Lee Mountains are unique geologic areas of the Mogollon Rim. There are extensive outcroppings of Coconino and Supai sandstone on the cliff faces of Munds and Lee Mountains underlying the most recent basalt flows.

The desired conditions for this area are in addition to those described for scenery in the Red Rock and Pine Belt MAs.

Desired Conditions for Munds Mountain Wilderness

SA-Wild-Munds-DC

1. A great diversity of vegetation and wildlife species and outstanding riparian habitat characterize this wilderness. Depending upon slope and aspect, several vegetation types are found including: Ponderosa Pine, Piñon-Juniper Evergreen Shrub, Interior Chaparral, and Mixed Broadleaf Deciduous Riparian Forest. There is a small portion of Semidesert Grasslands. Riparian vegetation and perennial water sources are maintained in the major drainages (see the desired conditions for these vegetation types for more information). Arizona cypress communities are preserved.
2. The deep drainages and rugged nature of the terrain offer many opportunities for primitive and unconfined activities including hiking, backpacking, horseback riding, swimming, rock climbing, bird watching, and hunting. The terrain provides many challenging recreation opportunities in areas with few trails. Due to the striking beauty of the red cliffs and riparian habitat, the wilderness also offers outstanding opportunities for photography and painting. In order to identify trail locations, cairns may be found along trails. At Bell Rock, visitors have an awareness of and sensitivity to Munds Mountain Wilderness.
3. Prehistoric sites are found in many different locales within the wilderness and reflect hunting activities as early as 9,000 years ago, as well as agricultural settlements by the Sinagua 900

years ago. Although there are no interpreted sites in the wilderness, it contains a great variety of Sinagua sites types, including small field houses, substantial habitation pueblos, so-called “forts,” field systems, and petroglyphs. Later activity by Yavapai and Apache are also present in rock shelters and caves as well as sites in the open. Many reflect long-term harvesting and cooking of agave in communal roasting pits. The historic Chaves Road skirts the south edge of the wilderness and provides a taste of what it was like to travel across this rugged area during pioneer times.

Red Rock–Secret Mountain Wilderness

General Description for Red Rock–Secret Mountain Wilderness

Located 20 miles south of Flagstaff, Red Rock–Secret Mountain Wilderness includes spectacular red, tan, and buff cliffs that mark the edge of the Colorado Plateau. The country plunges as much as 2,500 feet into canyons that drain into Oak Creek and the Verde River. Secret Mountain and Wilson Mountain are high mesas jutting out into the lower country. Several basalt lava flows cap the high cliffs of the older sedimentary rock formations. The area includes the dramatic backdrops and scenic cliffs that make Sedona a popular tourist spot.

This is an area of great climatic variation. The high rims are cool and moist most of the year, except for May and June. The south end of the wilderness, near Sedona, has a much warmer climate. Mid-winter temperatures average above freezing. The Oak Creek Canyon Research Natural Area (RNA), a diverse vegetation community, is in the wilderness (see the Oak Creek Canyon RNA direction for more information).

Red Rock–Secret Mountain Wilderness was most heavily occupied in prehistoric times by the Southern Sinagua during the A.D. 1150 to 1300 period. Cliff dwellings are the most notable site types, forming single family homes as well as storage facilities for crops grown on the mesa tops and canyon bottoms. The most impressive sites are on the edge of the wilderness, the cliff dwellings of Honanki and Palatki, both of which have outstanding examples of prehistoric pictographs that span the entire range of human occupation of the Verde Valley. Both sites are developed for public visitation.

The desired conditions for this area are in addition to those described for “Scenery” in the Sedona/Oak Creek and Pine Belt MAs.

Desired Conditions for Red Rock–Secret Mountain Wilderness

SA-Wild-SecretMtn-DC

1 There are seven major vegetation types: Ponderosa Pine, Mixed Conifer, Interior Chaparral, Piñon-Juniper Evergreen Shrub, Riparian Forests, and Semidesert Grasslands (see the desired conditions for these vegetation types for more information). Arizona cypress communities are preserved. The wide variety of vegetative types provides habitat for equally diverse wildlife populations.

2 Native fish populations in the West Fork of Oak Creek persist and are minimally affected by invasive aquatic species. Cliffs that are occupied peregrine falcon habitat are undisturbed during the breeding season. Invasive plants do not occur at levels that disrupt ecological functioning. Plants used for ethnobotanical purposes thrive here.

3 Heritage sites remain unaltered.

4 Spectacular red, tan, and buff cliffs that mark the edge of the Colorado Plateau are found throughout this wilderness. Steep forest canyons interspersed with red rock arches and formations provide outstanding opportunities for solitude farther into the area. Visitor encounters are higher at the eastern end of the West Fork of Oak Creek. Opportunities for primitive recreation are many. Primitive hiking is allowed, but overnight camping may be restricted because of the overlying research natural area and resource protection. Wilson Mountain National Recreation Trail provides an outstanding scenic hike within the wilderness. In order to provide for safety, cairns may be found along trails.

Strawberry Crater Wilderness

General Description for Strawberry Crater Wilderness

Located 30 minutes north and east of Flagstaff, Strawberry Crater Wilderness consists of gently rolling piñon-juniper hills, cinder terrain, and lava fields about 5,500 to 6,000 feet in elevation. Strawberry Crater is part of the San Francisco Peaks volcanic field, which contains some 600 craters and scoria cones. Strawberry Crater itself is about 50,000 to 100,000 years old. In appearance it is quite different from the younger, rounded cinder cones nearby. The crater was formed by slow moving basaltic andesite. The ridges of the central crater show the distinct layering that occurred during eruption. The ridges are broken at right angles to the ground and to one another. The jagged features and deep rust color of Strawberry Crater make it unique among local cinder cones. The area contains the Southwestern Region sensitive plant species Sunset Crater beardtongue (*Penstemon clutei*).

Strawberry Crater Wilderness shows evidence of occupation by the northern Sinagua who probably took advantage of a unique geological setting that exists nowhere else in the territory they occupied in prehistoric times. Strawberry Crater is also an important place to the Hopi and Navajo.

Because of the relatively open terrain and easy access from major roads, motor vehicle intrusion into the wilderness is an issue.

The desired conditions for this area are in addition to those described for “Scenery” in the Volcanic Woodlands MA.

Desired Conditions for Strawberry Crater Wilderness

SA-Wild-Straw-DC

1 Strawberry Crater Wilderness offers the visitor an opportunity to experience the sense of time and endless horizon presented by the piñon-juniper landscape. The area also contains transitional areas to the Ponderosa Pine and Great Basin Grasslands vegetation types (see the desired conditions for these vegetation types for more information). Strawberry Crater Wilderness shows little evidence of human visitation, and vegetation on its slopes is preserved. From the low cinder cones, there are high quality scenic views of the Painted Desert, the Hopi mesas, and the buttes of the Little Colorado River valley. On the horizon, the San Francisco Peaks and Sunset Crater add another dimension to the view. The area is strewn with cinders and evidence of the prehistoric volcanic activity that formed the area. The lava field to the north is a sea of black in the piñon-juniper landscape.

2 The area offers opportunities for day hiking, backpacking, and camping. The area provides ample opportunities for self-reliance and challenging navigation in a flat, densely vegetated area. Petrified bubbles of once boiling lava look as fresh as the sparse vegetation that struggles for a foothold on this rugged moonscape. There are a few game animals and small mammals throughout. Opportunities for solitude and for exploring interesting geological and archaeological features exist. Vehicle intrusions are rare and signing, fencing, and wilderness patrols on the boundary effectively enforce restrictions.

3 The construction of barriers and signage along the wilderness boundary prevent motor vehicle intrusion along the south and west boundaries of the wilderness. Educational materials about the sensitive soils and plants are provided to visitors.

West Clear Creek Wilderness

General Description for West Clear Creek Wilderness

Located 10 miles east of Camp Verde, West Clear Creek is one of the most rugged, remote canyons in northern Arizona. The canyon forms where Willow Valley and Clover Creek join near two access trails: Maxwell Trail and Tramway Trail. The canyon continues westward for approximately 27 miles, measured along the creek, ending near Bull Pen Ranch. The creek continues westward to join the Verde River south of Camp Verde. The canyon is very narrow for most of its length with many side canyons.

West Clear Creek Canyon is the longest of the canyons cutting through the Mogollon Rim, the edge of the Colorado Plateau. The formations visible in the canyon area are, from bottom to top, Late Paleozoic sedimentary rocks (Supai, Coconino, and Kaibab formations), Tertiary sediments, and Tertiary basalt lava flows.

The desired conditions for this area are in addition to those described for “Scenery” in the Verde Valley and Pine Belt MAs.

Desired Conditions for West Clear Creek Wilderness

SA-Wild-WClrCrk-DC

1 Major vegetation types in this wilderness are Piñon-Juniper Evergreen Shrub and Ponderosa Pine. The Riparian Forests and Semidesert and Montane Grasslands components add to the diversity of the canyon ecosystem (see the desired conditions for these vegetation types for more information). The terrain is rugged and provides for a variety of wildlife habitat. Hanging gardens on the upper slopes are undisturbed (see Riparian Types in the “Vegetation” section for further direction on springs and seeps).

2 Heritage sites remain undisturbed.

3 The canyon does contain some evidence of human use but the apparent naturalness of the area is unaffected. In spite of the short distance from the northern to the southern boundary, the area offers outstanding opportunities for solitude and primitive recreation by virtue of the very steep canyon walls. Access from Bull Pen Ranch to Bald Hill is fairly easy, even for inexperienced hikers or fishermen. There are short steep access trails that are unmaintained from the rim to the canyon bottom. In the main, narrow part of the canyon, there are no trails. Deep long pools make it necessary to wade or swim in many places when hiking from one end of the canyon to the other so that even the most seasoned hiker will find lots of

challenge. The canyon is wild and primitive. Interpretive materials associated with this wilderness advise that users need to plan trips carefully and be self-reliant.

Wet Beaver Wilderness

General Description for Wet Beaver Wilderness

Forty miles south of Flagstaff, Wet Beaver Wilderness commences at its eastern border at the confluence of Brady and Jacks Canyons. Moving west, the boundary follows the canyon rim. In the lower reaches of the canyon, the boundary moves back slightly from the rim to include some of the adjacent plateau. The area ends where Wet Beaver Creek Canyon opens toward the Verde Valley. Wet Beaver is a steep walled canyon cutting into the rim of the Colorado Plateau. Supai sandstone and shale form striking red cliffs along the lower canyon.

Like West Clear Creek Wilderness, prehistoric sites occur in almost all types of topographic situations along Wet Beaver Creek and reflect an adaptation to the unique canyon environment. Petroglyphs can be seen along Bell Trail that begins at the mouth of Wet Beaver Creek. Just outside the north edge of the wilderness is the ancient Palatkwabi Trail. It is likely that a side trail from Palatkwabi Trail entered the Verde Valley and was a major trade connection between the southern Sinagua of the Verde Valley and the early Hopi pueblos along the Little Colorado River and the Hopi mesas to the north.

The desired conditions for this area are in addition to those described for “Scenery” in the Verde Valley and Pine Belt MAs.

Desired Conditions for Wet Beaver Wilderness

SA-Wild-WetB-DC

1 The major vegetation type in this wilderness is Piñon-Juniper Evergreen Shrub, and the additional types of Ponderosa Pine, Semidesert Grasslands, and riparian types add to the diversity of the canyon ecosystem (see the desired conditions for these vegetation types for more information). Wet Beaver Wilderness provides recreation opportunities for waterplay, wildlife viewing, camping, and hiking while protecting the pristine riparian and aquatic resources. The perennial desert stream passes through a canyon of Supai sandstone, shale, and red rock. As visitors move eastward in the canyon, opportunities for solitude increase. Heritage sites remain undisturbed.

Sycamore Canyon Wilderness

General Description for Sycamore Canyon Wilderness

Sycamore Canyon Wilderness is on the Coconino, Kaibab, and Prescott National Forests. The direction in the Coconino NF plan provides direction for this wilderness area on all three national forests.

The southern portion of the area is a series of broad mesas with gently sloping drainage tributaries to the Verde River. Along the Verde River, there is extensive riparian habitat. The northern section is a series of foothills and canyons that rise to a 300-foot rim of rugged sandstone outcrops along Sycamore Canyon. Elevation ranges from 3,700 to 6,500 feet. These differences in elevation and aspect throughout the canyon result in a variety of contrasting ecological associations set in spectacular “red rock” geologic formations.

Sycamore Canyon has long been noted for its cliff dwellings as well as tall tales of lost Spanish gold mines and Mexican treasure hunters ambushed by Apaches. Prehistoric textiles found in one site in the 1930s show that cotton was once grown in areas like Sycamore Canyon, and that the Sinagua produced some of the most sophisticated and complex weaving technologies in the Southwest. Finely woven, highly decorated cotton textiles were undoubtedly one of the more important products the Sinagua traded to the northern pueblos along Palatkwabi Trail.

The desired conditions for this area are in addition to those described for "Scenery" in the Verde Valley, Red Rock, and Pine Belt MAs.

Desired Conditions for Sycamore Canyon Wilderness

SA-Wild-Sycamore-DC

1 The canyon walls represent a diversity of geological history such as red sandstone, white limestone, and brown lava. Vegetation in the canyon varies from Mixed Conifer with Aspen, Ponderosa Pine, and Montane and Semidesert Grasslands in the upper elevations to Interior Chaparral, Piñon-Juniper Evergreen Shrub, Piñon-Juniper Woodlands, Semidesert Grasslands, and Desert Communities in the lower elevations. The stream course is a Mixed Broadleaf Deciduous Riparian Forest (see the desired conditions for these vegetation types for more information). Along Sycamore Creek, the sycamore component is maintained as a higher proportion of the species composition than is seen in other mixed broadleaf deciduous vegetation types.

2 Visitors experience solitude and challenge in this diverse canyon and enjoy high-quality views of Red Rock Country.

3 Heritage sites remain undisturbed. Springs and historic cabins are protected from recreation impacts.

4 Sycamore Canyon Wilderness is a Class I Airshed (see Air Quality section).

5 Noxious weeds, such as tamarisk, are absent from the creek and associated springs.

Recommended Wilderness

See appendix A, map 17.

General Description for Recommended Wilderness

The proposed action includes three recommended wilderness areas—Walker Mountain, Strawberry Crater (addition), and Davey's (addition to Fossil Springs Wilderness)—that, if selected in the final plan, would use the interim direction below until they are designated by congressional action. Once an area is designated by Congress, the direction in this section no longer applies and the area is managed according to the Wilderness Act, Agency policy, and direction for designated wilderness in the previous section of the plan.

Desired Conditions for Recommended Wilderness

SA-RWild-DC

1 The primitive and undeveloped characteristics of recommended wilderness are maintained or enhanced. The presence of structures, construction, habitations, and other evidence of

modern human presence or occupation is minimal. Ecological systems are substantially free from the effects of modern civilization and evidence of modern human control or manipulation is reduced. Native species and unique features of the area are preserved. Scenery and wilderness recreation opportunities are emphasized over developments and mechanized forms of recreation. Mechanized recreation within the area does not detract from wilderness values. Motorized vehicle use is reduced. Archaeological sites remain undisturbed.

Objectives for Recommended Wilderness

SA-RWild-O

1 Develop and implement management plans for any newly designated wilderness areas within 5 years after designation occurs.

Guidelines for Recommended Wilderness

SA-RWild-G

1 Existing structures should be maintained but not expanded to maintain the area's wilderness character. Maintenance of existing structures should be carried out in a manner that does not expand the evidence of motor vehicle and mechanized equipment use beyond current conditions within the recommended wilderness area.

2 Where the line officer has discretion to do so, construction of new Forest Service and permitted structures should be avoided unless the facility and its future maintenance can be carried out in a manner consistent with the area's wilderness character.

3 Motor vehicle use should only occur for limited administrative and permitted activities to maintain the area's wilderness character.

4 Maintenance of existing trails should mitigate effects to soil and water resources while maintaining the primitive setting of the trail.

5 New trails should only be designed for activities that normally would be allowed in wilderness. Existing trails designed for other uses (e.g., bicycling or motor vehicle use) should be rehabilitated to meet more appropriate trail standards.

Management Approaches for Recommended Wilderness

Use the minimum requirement analysis as a framework to evaluate the potential effects of projects on wilderness character and to develop alternatives for projects within recommended wilderness.

Wild and Scenic Rivers

See appendix A, map 17.

Each congressionally designated wild and scenic river is required to have a comprehensive river management plan (CRMP). The CRMP establishes the river corridor boundary; includes detailed descriptions of the outstandingly remarkable values (ORVs); and addresses goals and desired conditions, development of lands and facilities, user capacities, water quality, instream flow, and monitoring strategy. It may also include standards and guidelines that are the equivalent of plan

direction. The entire CRMP is not incorporated by reference into this forest plan because some portions are meant to identify implementation and site-specific activities. However, explicitly identified management direction in the CRMP is incorporated by reference into the following plan direction.

Verde Wild and Scenic River[63]

General Description for the Verde Wild and Scenic River

The Verde Wild and Scenic River was designated by the Arizona Wilderness Act of 1984 (P.L. 98–406) on August 28, 1984. Beginning at the most southern point of the forest, the confluence of the Verde River and Fossil Creek, the wild and scenic river stretches northward approximately 22 miles to a parcel of private land south of Camp Verde. The wild and scenic river designation applies to both sides of the river and generally totals one-half mile wide (one-quarter mile on each side of the river). The area overlaps with a portion of Mazatzal Wilderness.

The desired conditions for this area are from chapter 3 of the CRMP and are in addition to those described for "Scenery" in the Verde Valley MA.

Desired Conditions for the Verde Wild and Scenic River

SA-WSR-Verde-DC

1 The scenic qualities of landform, vegetation, and water within the Verde Wild and Scenic River (VWSR) are distinctive. Landform varies from steep, rocky canyons framing the river to plateaus dropping to wide flood plains, with the river as a central feature. Vegetation varies according to terrain, from broad mesquite bosques and cottonwood gallery forests to narrow bands of riparian willows, in contrast to the surrounding dry grassland and desert vegetation, including barrel cactus. Scenic qualities of the perennial Verde River change dramatically with the seasons and with changes in riverflow. Dramatic fall color contrasts with summer greenery. Waterflow changes from shallow, still pools and slow water, to high flow, seasonal rapids, and waterfalls. Recreationists view the river corridor from the high edges of plateaus and canyons, from within the flood plain, from the riverbank, and from the surface of the river itself. The VWSR area is visually sensitive due to the combination of high viewer expectations, generally long duration of view, and high amount of detail visible to the viewer. The river corridor is characterized in many locations by open, expansive vistas viewed from numerous locations.

2 The VWSR offers exceptional river related recreation opportunities that emphasize nonmotorized recreation. Recreation activities occur at appropriate locations and intensities such that ORVs are protected and enhanced. Recreation opportunities and activities are primarily nature based and offer outstanding opportunities for experiencing scenic beauty and the intrinsic cultural and natural resources associated with the river. The high demand for both camping and day use of the VWSR is balanced with the maintenance of outstanding opportunities for primitive recreation and solitude. Facilities and management emphasize recreation opportunities for individuals, families, and small groups. Both day use and camping recreation opportunities are offered within a predominantly undeveloped river setting.

[63]The section for the Verde Wild and Scenic River comes from the comprehensive river management plan.

3 The Beasley Flat and Childs areas are managed for higher levels of visitation and to provide river access while meeting the demands of intensive day use recreation activities in the river's flood plain. Recreation facility operation, maintenance, enforcement, and management presence are consistent with desired resource conditions for outstandingly remarkable values (ORVs). Recreation user conflicts are minimal. Except for the developed areas of Childs and Beasley Flat, the VWSR is managed for a predominantly uncrowded setting. The character of recreation settings is identified and managed through the recreation opportunity spectrum (ROS). Recreation use activities and capacities are established for commercial and noncommercial uses consistent with ORVs and ROS and WOS (wilderness opportunity spectrum) classifications.

4 Visitors have opportunities for primitive recreation, solitude, and physical and mental challenge and inspiration consistent with preservation of the wilderness resource. Natural processes operate freely.

5 Roads and trails provide access within the VWSR consistent with protection and enhancement of scenic, cultural/historic, wildlife, and fish outstandingly remarkable values, and protection of soil and water quality. The transportation system supports interpretation, recreation, and resource management activities.

6 The river exists in a free-flowing condition with a range of flows that provide optimum conditions for native fish and wildlife and scenic quality. Healthy and diverse stands of riparian vegetation thrive along the banks and flood plain, reflecting the potential of the river's habitats and maintaining the channel at a higher level of stability. Recovery of channel and habitat conditions following scouring floods is not hindered by management activities within the VWSR corridor. Aquatic habitat is maintained in a condition with low substrate embeddedness, abundant aquatic food supply, and stable streambanks (see Riparian Types in the "Vegetation" section for more desired conditions).

7 The river corridor provides important consumptive and nonconsumptive wildlife use opportunities for visitors. The public is aware of these opportunities as well as species protection requirements. The public is aware of the importance of native fish and releases listed species when caught.

Standards for the Verde Wild and Scenic River

SA-WSR-Verde-S

1 Management standards are identified in the "Verde Wild and Scenic River Comprehensive River Management Plan" under chapter 3 "Management Direction for the Verde River Corridor" (Forest Service, 2004).

Management Approaches for the Verde Wild and Scenic River

Coordinate with the Arizona Department of Environmental Quality to monitor and achieve acceptable total maximum daily loads (TMDLs) for turbidity in the Verde River.

Fossil Creek Wild and Scenic River

General Description for Fossil Creek Wild and Scenic River

Fossil Creek Wild and Scenic River was designated by Congress in spring 2009. This designation included approximately 16.8 miles from the confluence of Sand Rock and Calf Pen Canyons to

the confluence with the Verde River; 9.3 miles of the river are classified as wild and 7.5 miles are recreational. The river is managed jointly by the Tonto and Coconino National Forests.

The Fossil Creek Wild and Scenic River is currently managed under interim direction and the comprehensive river management plan (CRMP) is being completed under a separate decision. Depending on the order of the decisions, the CRMP will either amend the 1987 plan and be carried forward as is into the revised plan or it will amend the revised plan.

Desired Conditions for Fossil Creek Wild and Scenic River

SA-WSR-FossilCrk-DC

1 The designated river and its adjacent areas retain their free-flowing character and outstandingly remarkable values and classifications.

Management Approach for Fossil Creek Wild and Scenic River

Manage the river consistent with the Coconino and Tonto National Forests' interim direction until such time as the CRMP is completed.

National Trails and Scenic Byways

See appendix A, map 2.

Arizona National Scenic Trail

General Description for Arizona National Scenic Trail

The Arizona National Scenic Trail (ANST) is a nonmotorized, largely primitive trail that stretches 800+ miles across Arizona to connect deserts, mountains, forests, wilderness, canyons, historic sites, communities, and people. It passes through some of the most renowned landscapes in the State and is the only national scenic trail in Arizona. The ANST showcases Arizona's diverse life zones and scenery and is enjoyed by a wide variety of nonmotorized recreationists, including hikers, equestrians, mountain bicyclists, and cross-country skiers. Starting in the Coronado National Memorial, on the border between the U.S. and Mexico, the trail climbs and descends from one Coronado National Forest "sky island" to another. North of the Coronado, the trail continues across rolling Sonoran Desert hills and mountains, crosses the Gila River, then winds through the Superstition Mountains and on to the Mogollon Rim and the forests of northern Arizona.

On the Coconino NF, the ANST ascends the Mogollon Rim and crosses the canyons and ridges of the Upper Clear Creek watershed. In this area, visitors come across the historic Battle of the Big Dry Wash and C.C. Cragin Reservoir. North of State Highway 87, the ANST crosses Anderson Mesa, where visitors encounter the grasslands and lakes of the plateau. The ANST crosses through the community of Flagstaff and then ascends the San Francisco Peaks. From there, visitors continue north across the volcanic field to the Kaibab National Forest and Grand Canyon. The ANST crosses the Grand Canyon on the South and North Kaibab Trails then continues across the Kaibab Plateau to end at the Utah border next to the Vermillion Cliffs National Monument. About 70 percent of the ANST lies on National Forest System land, but the ANST also crosses Bureau of Land Management, National Park Service, Arizona State Parks, Arizona State Trust, county, private, and municipal lands.

Desired Conditions for Arizona National Scenic Trail

SA-Trl&Bwy-AzT-DC

1 The ANST provides both short and long distance nonmotorized recreation opportunities in mainly remote and primitive settings representative of the dramatic natural landscapes and varied vegetation of Arizona. Along most of the trail, infrastructure and facilities are few and are constructed in such a way as to be compatible with the scenic, natural, historic, and cultural qualities for which the ANST was established. In remote areas, the sights and sounds of roads, motorized trails, utility corridors, and other facilities are rarely encountered. Near towns and developed recreation facilities, the ANST may become a more accessible and highly developed route with access to amenities via connector trails. Recreation and other activities on or adjacent to the ANST do not negatively impact cultural and natural resources, scenic integrity, or the nonmotorized recreation experience. User conflicts are infrequent. Signage, while unobtrusive, is present to help long-distance travelers find nearby developed sites, trailheads, recreation facilities, and drinking water sources. Trailheads are conveniently located and, where equestrian use is common, parking space for trucks pulling trailers exists.

Guidelines for Arizona National Scenic Trail

SA-Trl&Bwy-AzT-G

1 Fire on, or in, the foreground of the ANST should be managed using minimum impact suppression tactics, or other tactics appropriate for the protection of values and resources for which the trail was designated[64].

2 To retain the character for which the trail was designated, management actions should not result in recreation setting changes from less to more developed, particularly within the foreground (a half of a mile) of the ANST.

3 Permitted recreation special use authorizations should be managed to protect the desired recreation setting for a nonmotorized trail.

4 New road or motorized trail construction across or adjacent to the ANST should be avoided to protect the nonmotorized setting.

5 Placement of new utility corridors and communication facilities across the trail should be avoided by choosing alternate locations or colocating them with existing utility corridors and facilities to minimize the number of disruptions on the trail experience.

6 Forest health projects should be managed to minimize long term visual impacts within and adjacent to the ANST corridor.

Management Approaches for Arizona National Scenic Trail

Work with adjacent landowners and the Arizona Trail Association to maintain the trail corridor and the condition and character of the surrounding landscape.

Manage the ANST and corridor consistent with the "Arizona Trail Management Guide" (Arizona State Parks, 1995) until such time as the comprehensive management plan[65] is completed.

[64] The source for this guideline is "Minimum Impact Suppression Tactics Guidelines for the Northern Region of U.S. Department of Agriculture Forest Service" (Jolly, 1993).

Manage the ANST and corridor consistent with the comprehensive management plan when completed.

General Crook National Recreation Trail

General Description for General Crook National Recreation Trail

When American settlers first began homesteading in Arizona, the Army established outposts at Fort McDowell, Fort Verde, Camp Reno, Fort Apache, and Camp San Carlos. General George Crook, who was the head of the military department, established a supply route along the Mogollon Rim. This route became one of the first major roads in Arizona and for decades was used as a supply and communications route, as well as a patrol route for monitoring the western Apache. Today, the original blazes can still be seen on the ponderosa pines lining the trail, as well as occasional traces of homesteads. The trail is multiuse and popular with equestrians and mountain bikers as well as hikers. The trail is 114 miles long, from Fort Verde to west of Cottonwood Wash[66].

The General Crook Trail has been designated as a national recreation trail and is being studied for nomination as a national historic trail. The trail, also known as Crook Road, was developed along the Mogollon Rim as a way of quickly moving troops between Fort Whipple, Fort Verde, and Fort Apache during the Apache Wars period of the 1870s and 1880s. The road was engineered by General Crook, likely following earlier American Indian trails. A "V" and a number indicating the miles from Fort Verde was cut into rocks or trees each mile along the road. Most of these are now gone, but the "V-13" still can be seen at 13 Mile Rock. White and yellow chevrons now mark the route of the national recreation trail, which generally follows the historic route. The trail is eligible as a national historic trail pending completion of an approved trail study.

Desired Conditions for General Crook National Recreation Trail

SA-Trl&Bwy-Crook-DC

1 The historic route and associated values are preserved. Foot and horse travel are the emphasized recreation activities on the trail. Signage is provided to advise the public of motorized restrictions on the trail. The needs of people with disabilities and those with limited mobility are considered in developing access facilities for the trail. Recreational facilities for the trail are related to significant interpretive and recreation points of interest on or adjacent to the trail. Interpretation of the trail is consistent across landownership and Forest Service administrative boundaries.

Standards for General Crook National Recreation Trail

SA-Trl&Bwy-Crook-S

1 Protect General Crook National Recreation Trail chevrons and route markers and historic milepost markers.

[65] This management plan is in development as of the time of forest plan revision.

[66] Source: Public Lands Information Center, www.publiclands.org

Management Approaches General Crook National Recreation Trail

Manage the 138-mile General Crook Trail corridor on National Forest System land from Fort Whipple to Fort Apache and associated historic sites and side trails in cooperation with adjacent national forests, tribes, and private landowners for potential congressional designation as a national historic trail.

Cooperate with partners to develop one representative visual logo for the entire trail with adjacent national forests and local entities.

Wilson Mountain National Recreation Trail

General Description for Wilson Mountain National Recreation Trail

This trail is a strenuous 5.6 miles to the top of Wilson Mountain and provides some of the most panoramic views in the Oak Creek Canyon/Sedona area. There is no unique direction for this trail.

Desired Conditions for Wilson Mountain National Recreation Trail

SA-Trl&Bwy-WilMtn-DC

1 Wilson Mountain Trail retains its scenic integrity and provides broad views of Red Rock Country. Recreation opportunities on the trail are consistent with the transition wilderness opportunity spectrum (WOS).

All Scenic Byways

Desired Conditions for All Scenic Byways

SA-Trl&Bwy-Bywy-All-DC

1 Along scenic byways, visitors find occasional developed recreation sites that provide desired amenities (e.g., restrooms, picnic tables). These facilities are mostly in character with the National Forest System setting, except where it is appropriate to match the character of the built environment. Occasionally, visitors see small historic sites—these areas are positive scenic elements, providing a glimpse of times past.

Management Approach for All Scenic Byways

Work closely with the Arizona Department of Transportation and local communities to promote and improve services and interpretive opportunities on byways.

Historic Route 66 All-American Road

General Description for Historic Route 66 All-American Road

Historic Route 66 All-American Road (or Route 66) is known as “The Mother Road” as it heralded the development of the U.S. highway system. With its history starting with American Indian trails across the country, it developed over the years into the first national highway linking Chicago and Los Angeles. Its route was pioneered along the 35th Parallel with the engineering explorations of Lieutenant Edward Fitzgerald Beale in 1857 to 1859. He later directed the construction of Beale Road, which opened up the western frontier for settlers, ranchers, and the military. When transcontinental railroad construction began in the 1880s, its route followed the

Beale Road and encouraged the growth of towns and commercial development of the West. The main period of significance for Route 66 began with its construction in 1920 until 1944, when the Federal-Aid Highway Act (P.L.78-521) was passed. “The Main Street of America,” as it came to be known, was replaced in 1956 with the construction of Interstate 40**.**

Route 66 occupies a special place in American popular culture and history as it represents freedom, mobility, and adventure. Nowhere is that more prevalent than the open lands of northern Arizona along Route 66. The Mother Road, Main Street USA, and Get Your Kicks on Route 66 are all synonymous with the wonderful resource. Unfortunately, the actual condition of the remaining route and its former attractions is less than desirable and is the driving force behind efforts of communities along the byway to save what remains (Arizona Department of Transportation, 2005). There are short segments of the official byway crossing the Coconino NF and many parallel routes that were formerly part of the Mother Road.

Desired Conditions for Historic Route 66 All-American Road

SA-Trl&Bwy-Rt66-DC

1 Arizona Historic Route 66 All-American Road is preserved and promoted in a manner that protects its intrinsic qualities and enhances visitors’ appreciation of the scenic, natural, recreational, cultural, historical, and archaeological resources of the corridor. The highway serves as a vital link between the communities along the route and provides a direct connection to the diverse historic and cultural visitor opportunities within northern Arizona.

2 Historic alignments of Route 66 are interpreted and their locations are made available to the public. Interpretation of these alignments emphasizes the history of highway development and the changing uses across the forest that are associated with the time period that the alignment was part of Route 66.

Guidelines for Historic Route 66 All-American Road

SA-Trl&Bwy-Rt66-G

1 To retain its historic character, signage and facilities on Route 66 should incorporate elements of historic roadside architecture including, but not limited to, elements of the cultural landscape from nearby communities or historic Forest Service design.

2 Activities along the byway should be consistent with direction in the “Arizona Historic Route 66 Corridor Management Plan” to ensure consistency with other jurisdictions.

Management Approaches for Historic Route 66 All-American Road

Partner with the Route 66 Scenic Byway Association to coordinate activities and design of byway facilities.

Red Rock All-American Road

General Description for Red Rock All-American Road

The 7.5-mile Red Rock All-American Road, from milepost (MP) 302.5 to MP 310.0 on State Highway 179, is the gateway to the Red Rock Management Area and Sedona/Oak Creek MA. The major buttes and scenic attractions that characterize the area are visible along the road. The

Forest Service manages the majority of the viewshed, with the exception of the village of Oak Creek and Sedona.

Desired Conditions for Red Rock All-American Road

SA-Trl&Bwy-RedRck-DC

1 The Red Rock All-American Road is preserved and promoted in a manner that protects its intrinsic qualities and enhances visitors' appreciation of the scenic, natural, recreational, cultural, historical, and archaeological resources of the corridor. Views of prominent red rock formations such as Bell Rock, Courthouse Rock, and Cathedral Rock are unobstructed from the byway. Scenic pullouts are provided along the byway with safe vistas for photography and scenery viewing, facilities such as restrooms, and interpretive signs. Travel routes along the byway accommodate bicycles and pedestrians safely and connect them to the urban trail system. Wildlife crossings reduce the risk of wildlife mortality. Alternative transportation is provided to increase the sustainability of tourism on the byway.

Guidelines for Red Rock All-American Road

SA-Trl&Bwy-RedRck-G

1 Activities along the byway should be consistent with direction in the "Red Rock Scenic Road Corridor Management Plan" (Federal Highway Administration and Arizona Department of Transportation, 2005) to ensure consistency with other jurisdictions.

Research Natural Areas and Botanical and Geological Areas

See appendix A, map 2.

General Description for Research Natural Areas and Botanical and Geological Areas

Research natural areas (RNAs), botanical, and geological areas are designated to ensure protection of specific biological and geological communities. Research natural areas are areas that the Forest Service has designated to be permanently protected and maintained in natural condition, so they may serve as experimental research controls and monitoring sites for the particular ecosystem they represent and used for education.

There are four existing RNAs on the Coconino NF: Casner Canyon, G.A. Pearson, Oak Creek Canyon, and San Francisco Peaks. G.A. Pearson is within the Fort Valley Experimental Forest and, therefore, is not managed by this plan. Oak Creek Canyon and the San Francisco Peaks RNAs are within designated wilderness. The revised plan is proposing three new RNAs: West Clear Creek, Rocky Gulch, and an expansion of the existing San Francisco Peaks RNA. A version of all three of these areas was proposed by the 1987 plan but never established. In the 1987 plan, the RNA in West Clear Creek was proposed in a different location than the current recommendation, and the expansion of the existing San Francisco Peaks RNA was larger than the current recommendation. West Clear Creek and the expansion of the San Francisco Peaks are within existing wilderness and will, therefore, be managed in accordance with Agency policy on retaining wilderness character. Direction for RNAs (listed below) should be applied to both proposed and established RNAs.

Botanical and geological areas are designated for a special feature such as a rare plant or exemplary geological formation. There are four existing botanical areas—Verde Valley, Mogollon Rim, Fossil Springs, and Fern Mountain; one existing geological area—Red Mountain; and one proposed geological area—Cottonwood Basin Fumaroles.

Desired Conditions for Research Natural Areas and Botanical and Geological Areas

SA-RNABotGeo-DC

Research Natural Areas

1 Research natural areas have excellent examples of the ecological features for which they were designated, with little evidence of human activity or disturbance. Visitor access and use occurs at environmentally acceptable levels to maintain the research values of the RNA. Special use permits within these areas are inappropriate unless they are related to research for which the area is designated. Fire management mimics natural fire processes and is compatible with ongoing research.

2 Casner Canyon RNA protects the ecological integrity of a pure stand of Arizona cypress along with Supai sandstone.

3 San Francisco Peaks RNA and its recommended expansion retain the characteristics of the transition zone between Mixed Conifer and Alpine Tundra with populations of bristlecone pine.

4 The Oak Creek Canyon RNA protects a diversity of vegetation within Oak Creek Canyon. The Oak Creek Canyon RNA is an example of a biologically diverse creekside area and is a paleobotanical area containing plant species surviving from the last ice age.

5 Rocky Gulch proposed RNA retains the ecological integrity of old-growth ponderosa pine, and it is a control for research in the Beaver Creek watershed.

6 West Clear Creek proposed RNA retains the riparian communities in a steep canyon setting as well as hanging gardens and springs.

Botanical Areas

7 Botanical areas protect the plants and plant communities for which they are designated. Plants and plant communities within these areas are resilient and are not negatively impacted from human activities. Nonmotorized recreation is allowed on a limited basis on designated trails to protect soil conditions and hydrologic flow. New trails are discouraged.

8 Verde Valley Botanical Area preserves a unique, limestone dependent desert community containing Arizona cliffrose, which has been greatly reduced by human conversion of its habitat.

9 The Mogollon Rim Botanical Area preserves a white fir/bigtooth maple community and represents a unique vegetation type in Arizona, found only at a few locations along the Mogollon Rim.

10 Fern Mountain Botanical Area preserves a high elevation riparian scrub community dominated by Bebb’s willow.

11 Fossil Springs Botanical Area preserves a riparian deciduous forest associated with a large perennial spring and travertine geology.

12 Soil productivity and functions (including the ability of the soil to resist erosion, infiltrate water, and recycle nutrients) are sustained so botanical areas are more resilient and can better adapt to climate change.

Geological Areas

13 The Red Mountain Geological Area preserves a unique cinder cone whose internal structure is exposed within the San Francisco Peaks volcanic field. The large natural amphitheater cut into the cone's northeast flank is free of alterations by human activity. Erosional pillars called "hoodoos" are retained in the amphitheater, and dark mineral crystals that erode out of its walls are preserved (U.S. Geological Survey, 2007). These asymmetrical cinder cones, amphitheater, erosional pillars or hoodoos, and minerals for which the area was designated, are predominantly undisturbed by administrative or research and recreation activities. Nonmotorized recreation within the area allows for access to view the unique geological formations. Cinder slopes are protected from human-caused erosion.

14 The Cottonwood Basin Fumaroles Geological Area preserves a unique and interesting geologic landscape that developed from volcanic fumaroles (hot springs) that formed within the Towel Creek Tuff that was deposited in the lakebed of Cottonwood Basin by the Hackberry Volcano some 8 million years ago. The formations resembling tepees or cones with holes or caverns in the rock are retained, and the physical and chemical weathering processes that exposed them are not accelerated by human activities. The cones, pipes, relict fumaroles, and erosional caps are protected from human activities. The vegetation unique to the fumaroles is undisturbed. There is no evidence of vandalism, trash dumping, or human alteration of the volcanic formations. The area is predominantly accessible by foot travel. The educational and scientific value of the geological landscape is highlighted and interpreted. Interpretive materials are available that describe the geological history of the area and highlight preservation and conservation of unique rock and plant features.

Objectives for Research Natural Areas and Botanical and Geological Areas

SA-RNABotGeo-O

1 Within 2 years of plan approval, prepare establishment reports for Rocky Gulch, West Clear Creek, and the eastern expansion of the San Francisco Peaks RNAs.

Standards for Research Natural Areas and Botanical and Geological Areas

SA-RNABotGeo-S

1 Overnight camping and recreation campfires are prohibited in established RNAs.

2 Prohibit permitted commercial tours except in support of approved research in established RNAs.

Guidelines for Research Natural Areas and Botanical and Geological Areas

SA-RNABotGeo-G

1 Recreation uses should be excluded from RNAs and botanical and geological areas where they have a negative impact on the resource for which the area is designated.

2 Fire should be managed using minimal impact suppression tactics or other appropriate suppression tactics to protect the resources for which RNAs and botanical and geological areas were designated.

3 Noncommercial group size should be limited to 25 persons or fewer in Casner RNA and 12 persons or fewer without a permit in the Oak Creek Canyon RNA.

4 Allotment management plans should have provisions to protect the uniqueness and/or ecological condition of the special areas.

5 Removal of rocks from the geological areas should be limited to collection for approved scientific purposes and carried out under the appropriate authorization (i.e., special use permit, agreement).

Management Approaches for Research Natural Areas and Botanical and Geological Areas

Encourage partnerships with site stewards to provide onsite interpretation and monitoring for the Cottonwood Basin Fumaroles Geological Area.

Environmental Study Areas

See appendix A, map 2.

General Description for Environmental Study Areas

Environmental study areas (ESAs) are locations on the forest that are set aside from development for the purpose of environmental education. Each area has an approved school curriculum associated with it and is associated with a specific school.

Mount Elden ESA is located at the base of Mount Elden, adjacent to the subdivisions of Shadow Mountain, Paradise Hills, Skyline Estates, and Swiss Manor and adjacent to Buffalo Park. Originally a bird sanctuary, Mount Elden ESA is a popular daytime destination for hiking, dog walking, mountain biking, and horse riding. The El Paso Natural Gas pipeline crosses the area. Old Caves Crater ESA is located north of Silver Saddle Road, east of U.S. Highway 89, and adjacent to the Doney Park communities. Griffith's Spring ESA is located south of Flagstaff on State Highway 89A, adjacent to the Forest Highlands community and just south of Pine Dell.

Desired Conditions for Environmental Study Areas

SA-ESA-DC

Elden ESA

1 Trails provide for popular hikes that are convenient and easy to use and environmental education opportunities for the general public as well as school groups. The area is available

for study, and recreation and is an integral part of the Flagstaff Public School curriculum. There are many formal access points developed along the edge of subdivisions providing public access. This ESA strengthens the opportunities for partnerships between the school, Forest Service, and Arizona Game and Fish Department. A wintering deer herd provides an opportunity for wildlife viewing by the students.

Old Caves Crater ESA

2 This large volcanic cinder cone has diverse vegetation, provides scenic backdrops to surrounding residents, and contains archaeological sites and cultural values. Teachers at local schools have curriculums for the area, and students can safely learn about the forest resources while visiting the site. There are trails in the area and high levels of nonmotorized daytime dispersed recreation use.

Griffith's Spring ESA

3 Among a variety of uses, local teachers use the spring and its stream channel as an outdoor classroom. The area is accessible to visitors traveling State Highway 89A who stop here for picnics and daytime walks and to nearby residents. There is a stream channel with riparian vegetation and aquatic species. A nearby wet meadow adds additional diversity.

Guidelines for Environmental Study Areas

SA-ESA-G

1 New transmission corridors should avoid the Elden ESA to protect the educational resources and setting.

2 New special use authorizations or amendments to existing special use authorizations that would or could adversely affect or change the character of the ESA should not allowed.

3 ESAs that are not currently open to livestock grazing should remain closed in order to preserve their educational and ecological opportunities and to minimize human–livestock interactions.

4 The Elden ESA should be open to the public for foot traffic and day use only, and horses should be allowed on the pipeline trail in order to provide for the desired visitor experiences and minimize use conflicts.

Management Approaches for Environmental Study Areas

Plan and support uses and trails in conjunction with curriculum needs of the associated public schools. Develop environmental education programs cooperatively with public schools.

Experimental Forests

See appendix A, map 2.

The Forest Service's experimental forests are dedicated to long-term research on ecosystem processes, silviculture and forest management options, wildlife habitat characteristics, and forest growth and development. The nearby Fort Valley and Long Valley Experimental Forests are managed by the Rocky Mountain Research Station and not by the Coconino NF. Therefore, direction in this plan does not apply to these areas.

Chapter 4. Suitable Uses

Introduction

The identification of an area as suitable for various uses is guidance for project and activity decisionmaking and is not a commitment or a final decision approving projects and activities. Uses that are not specifically identified as suitable are generally not allowed and would be evaluated at the project level relative to desired conditions and could be reclassified as suitable. Uses that are neutral to or help move the forest toward the desired conditions may be allowed. Uses that are suitable must also be consistent with other plan components and other laws and regulations.

Timber Suitability

See appendix A, map 18.

The National Forest Management Act (NFMA) requires that National Forest System (NFS) lands be classified as to their suitability for timber production. NFS lands were reserved with the intent of providing goods and services to satisfy public needs over the long term. Among these goods is the production of a sustainable supply of forest products. Timber production is the purposeful growing, tending, harvesting, and regeneration of regulated crops of trees for industrial or consumer use. Timber production activities can contribute to social, economic, and ecological sustainability. For example, timber production may offset some or all of the costs of silvicultural treatments and other forest development or maintenance activities that restore ecosystems to desired conditions, lower uncharacteristic fire and insect risk, increase understory plant diversity and abundance, and create employment opportunities.

Areas unsuitable for timber production are those where it is either not desirable or feasible to manage for periodic harvests of forest products. For example, restoration of grasslands often requires cutting trees. These trees can be made available for sale, but the intent for the future is to maintain them as grasslands. In this case, timber production is not desirable. Where long-term resource productivity would be impaired or law, regulation, or policy prohibits it, timber production is not feasible.

In accordance with the provisions of the 1982 planning rule provisions and using guidance from the Southwestern Regional Office (Forest Service, 2011b), an analysis was conducted on all NFS lands managed by the Coconino NF to determine the acres of land that are categorized as suitable or not suitable for timber production. Table 14 provides acreages used in the timber suitability calculation. See the “Vegetation and Fire” section in appendix C, “Methodology and Analysis Process,” of the “Draft Environmental Impact Statement for the Coconino National Forest Land and Resource Management Plan” (Forest Service, 2013) for additional information about the methodology used to calculate timber suitability.

Table 14. Timber suitability acreage calculation

Land Category	Acres
Coconino NF (total acres)	1,851,626
Non-forested lands	-992,224
Lands withdrawn from timber production	-113,857
Lands where irreversible resource damage is likely	-48,633
Lands where adequate restocking is not assured	-80,074
Subtotal of acres not suitable for timber production	*1,234,788*
Land Tentatively Suitable for Timber Production	**616,838**
Lands where management prescriptions preclude timber production[67]	-80,281
Lands where management objectives limit timber harvest	0
Lands that are not economically cost efficient in meeting timber objectives [68]	-8,876
Subtotal of acres not appropriate for timber production	*89,157*
Land Suitable for Timber Production	**527,681**

Grazing Suitability

Procedures in the 1982 Planning Rule require that the suitability and capability of National Forest System lands for producing forage for grazing animals be determined in forest planning. Suitability is the appropriateness of applying certain resource management practices to a particular area of land in consideration of the relevant social, economic, and ecological factors. Capability is the potential of an area of land to produce resources and supply goods and services. Capability depends upon current conditions and site conditions such as climate, slope, landform, soils, and geology.

Suitability is determined based on compatibility with desired conditions and objectives in the plan area. Lands within the plan area are not identified as suitable for a certain use if that use is prohibited by law, regulation, or policy; would result in substantial and permanent impairment of the productivity of the land or renewable resources; or if the use is incompatible with the desired conditions for the relevant portion of the plan area. Designation of an area as suitable for a particular use does not mean that the use will occur over the entire area. Likewise, a determination that a particular use is not suitable in a management area does not mean that the use will not occur in specific areas. The identification of an area as suitable for various uses is *guidance* for project and activity decisionmaking; it is *not a resource commitment or final decision* approving projects and activities. Final decisions on resource commitments are made at

[67] Lands shall be tentatively identified as not appropriate for timber production to meet objectives of the alternative being considered if: based upon a consideration of multiple-use objectives for the alternative, the land is proposed for resource uses that preclude timber production (National Forest System Land and Resource Management Planning - 1982 Planning Rule, (219.14(c)(1)).

[68] Decribes land where the cost for harvest and removal of material exceeds the value of the product.

the project level. The final decision to authorize livestock grazing would be made at a project (allotment) level.

The following areas of the forest are not suitable for livestock grazing[69], as determined by previous NEPA decisions or prior planning decisions (1987 plan as amended). Any area not listed is identified to be suitable for livestock grazing. See appendix C, Methodology and Analysis Process, of the accompanying "Draft Environmental Impact Statement for the Coconino National Forest Land and Resource Management Plan" for the description of the range capability and suitability evaluation process.

- Allotments closed prior to 1987 (Camp Verde, Middle Verde, Montezuma, Rimrock, Cave Hill, and Dry Creek);
- Portions of allotments closed prior to 1987 (Cottonwood, Cinder, Turkey Tanks, Deadman, Dove Tanks, Frisco Mountain, Hart Prairie, Tom's Creek, Indian Gardens, and Oak Creek);
- Strawberry Crater Wilderness;
- Tundra and upper mixed conifer/spruce-fir slopes within the Kachina Peaks Wilderness (areas above 9,500 feet elevation);
- Stoneman Lake basin;
- Cinder Hills Off-highway Vehicle Area;
- Oak Creek Canyon (formerly Management Area 14);
- Developed recreation sites and Snow Bowl special use authorization area;
- Inner Basin (formerly Management Area 16);
- Oak Creek Canyon Research Natural Area;
- Casner Research Natural Area;
- Elden Environmental Study Area:
- Old Cave Crater Environmental Study Area
- Griffith's Spring Environmental Study Area:
- Right-of-way in the Highway 180 Travel Corridor;
- Riparian habitat in the Verde Wild and Scenic River corridor, unless site-specific NEPA analysis approved by the forest supervisor authorizes future grazing use;
- Horse Mesa, Boynton Canyon, and Sedona allotments;
- Portions of the Buck Springs Allotment (as described in the decision notice signed on August 18, 2003);
- South Newman, Walnut, and West Walnut Pastures in the Walnut Canyon Allotment.

[69] The Beaverhead-Grief Hill sheep driveway overlaps some of the areas listed as not suitable for livestock grazing, including but not limited to, the former Montezuma and Horse Mesa grazing allotments. This multi-forest sheep driveway provides temporary use to seasonally move sheep from lower elevations on the Prescott National Forest to higher elevation summer range on the Coconino and Kaibab National Forests. This driveway remains suitable for livestock grazing associated with the temporary, seasonal use by domestic sheep herds.

Recreation and Transportation Suitability

Table 15 displays areas that are suitable or not suitable for motorized uses, including new motorized areas, roads, motorized trails, temporary or permanent road construction, and mechanized travel and nonmotorized travel. These areas were determined based on the activities appropriate for the Recreation Opportunity Spectrum allocation and for special areas, given law, regulation, policy, and desired conditions.

Nonmotorized travel (not including mechanized travel) is defined as movement not relying on machines that use a motor, engine, or other nonliving power source (e.g., walking, canoeing, and horseback riding).

Mechanized travel is defined as movement using any contrivance over land, water, or air, having moving parts that provides a mechanical advantage to the user and that is powered by a living or nonliving power source. This includes, but is not limited to: sailboats, hang gliders, parachutes, bicycles, game carriers, carts, and wagons. Mechanized travel does not include wheelchairs or mobility devices when used as necessary by a mobility-impaired person for locomotion (Forest Service Manual 2353.05). It also does not include skis, snowshoes, rafts, canoes, sleds, travois, or similar primitive devices without moving parts.

Motorized travel[70] is defined as movement using machines that use a motor, engine, or other nonliving power sources other than a vehicle operated on rails or a wheelchair or mobility device (including one that is battery powered) that is designed solely for use by a mobility-impaired person for locomotion and that is suitable for use in an indoor pedestrian area.

A **motorized area** is one that has been designated for motor vehicle use.

NFS roads and trails are roads and trails that the Forest Service determines are necessary for the protection, administration, and utilization of the National Forest System and the use and development of its resources.

NFS motorized trails are divided into two categories—greater than 50 inches and less than 50 inches—to accommodate a variety of vehicles, including single track vehicles.

Temporary roads are roads necessary for emergency operations or are authorized by contract, permit, lease, or other written authorization, and they are not a NFS road or trail and not included in a forest transportation atlas. Temporary roads are obliterated or rehabilitated following the completion of the activity for which they were built.

[70] The Travel Management Rule decision is in effect on the Coconino NF (September 2011). Under this decision, the forest has designated specific roads, trails, and areas suitable for motorized vehicle use. These designations have been identified on a motor vehicle use map (MVUM) and, in general, cross-country motorized travel is prohibited. This forest plan provides the framework in which the MVUM is developed and any other subsequent travel guidance on the forest.

Table 15. Recreation and transportation suitability

ROS[1] & Special Area Designations	New Motorized Areas	NFS Roads & Motorized Trails > 50”	NFS Motorized Trails < 50”	Temporary Roads	Permanent Roads	Mechanized Travel	Nonmotorized Travel
Urban and Rural ROS	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Roaded Natural ROS	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
SPM ROS	Not Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
SPNM ROS	Not Suitable	Not Suitable	Not Suitable	Suitable	Not Suitable	Suitable	Suitable
Primitive ROS	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable	Suitable
Recommended RNA	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable
RNA	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable
Botanical and Geological Areas	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable
Environmental Study Areas	Not Suitable	Not Suitable	Not Suitable	Suitable	Not Suitable	Suitable	Suitable
Recommended Wilderness	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable	Suitable
Wilderness	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable
Eligible or Designated WSR – Recreation and Scenic	Not Suitable	Suitable	Suitable	Suitable	Suitable	Suitable	Suitable
Eligible or Designated WSR – Wild	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Not Suitable	Suitable	Suitable

[1] ROS = Recreation Opprtunity Spectrum; SPM = Semiprimitive Motorized; SPNM = Semiprimitive Nonmotorized; RNA = Research Natural Area; WSR = Wild and Scenic River.

Chapter 5. Monitoring Strategy

Introduction

The purpose of monitoring and evaluation is to evaluate, document, and report how the forest plan is applied, how well it works, and if its purpose and direction remain appropriate. Monitoring determines actual conditions and compares them with desired conditions. Evaluation of monitoring results may identify that desired conditions are not met and propose alternative management strategies that respond to changing conditions or new information, including research and scientific papers. Monitoring and evaluating the effects of plan implementation is critical to adaptive management.

Given the uncertainty of future budgets and resources, the focus and intent of this monitoring strategy is to evaluate the progress of not only required monitoring elements but also particular areas where the current condition at the time of the development of this plan was drastically different from desired conditions. In this way, the forest can direct resources toward and evaluate progress of, critical changes that need to occur on the forest.

The monitoring plan consists of monitoring questions that focus on key plan decisions where carrying out projects and activities are likely to cause a change over time and include both implementation as well as effectiveness monitoring.

The forest supervisor annually evaluates the monitoring information displayed in the evaluation reports through a management review and determines if any changes are needed in management actions or the plan itself. In general, annual evaluations of the monitoring information consider the following questions:

- What are the effects of resource management activities on the productivity of the land?
- To what degree are resource management activities maintaining or making progress toward the desired conditions and objectives identified in the plan?
- What modifications are needed to account for unanticipated changes in conditions?

In addition to annual monitoring, the forest supervisor reviews the conditions on the land covered by the plan at least every 5 years to determine whether conditions or demands of the public have changed significantly. The plan is ordinarily revised on a 10-year cycle and the forest supervisor may amend the plan at any time. All of the monitoring and evaluation timeframes identified in this chapter begin from the date of the record of decision.

Monitoring Plan

The monitoring questions and potential monitoring methods that could be used to evaluate movement toward key plan desired conditions are displayed below (table 16).

For each monitoring question/performance measure listed in table 17, additional monitoring descriptors are included to provide context for the type of information to gather and how often to gather it. These descriptors are defined here:

- **Monitoring Question**: The question(s) that will be answered.
- **Scale**: The geographic scale at which the monitoring question will be evaluated.
- **Possible Monitoring Methods and Data Sources**: The possible methods and data sources available to evaluate the monitoring questions at the time of plan approval and

are not the required method of measurement. As new tools become available, other methods may be used to answer the monitoring questions.

- **Frequency of Monitoring**: How often information is gathered or measured such as annually, every 5 years, or every 10 years.
- **Frequency of Evaluation**: How often the information is analyzed and reported. Depending upon the question being answered, analysis of the information may occur at longer time intervals than the frequency of monitoring. Some resources need to be monitored annually to produce trend data. Annually gathered data may be analyzed periodically (e.g., 3-, 5-, or 10-year cycles), depending upon the timeframe specified by each objective.
- **Data Precision and Reliability**: An indication of how rigorous the information used to evaluate the monitoring question is with respect to repeatability, reliability, accuracy, and precision. Two categories of precision and reliability are appropriate at the plan scale, and because of varying methods and data sources used to evaluate the monitoring question, both classes may be indicated. Classes of precision and reliability, however, are not meant to identify which methods and data sources may be most appropriate to answer the monitoring question.
    - **Class A**: Methods that are generally well accepted for modeling or quantitative measurement. Results have a high degree of repeatability, reliability, accuracy, and precision.
    - **Class B**: Methods or measurements that are based on project records, personal communications, ocular estimates, pace transects, informal visitor surveys, and similar types of assessments. The degree of repeatability, reliability, accuracy, and precision are not as high as Class A methods, but they still provide valuable information.

Monitoring and evaluation are identified, approved, and scheduled through the annual budget process. Actual budget levels, funding emphasis, and emergence of new issues may affect accomplishment of both management activities that make progress toward desired conditions as well as monitoring. Partnerships may be developed to accomplish monitoring and evaluation.

Table 16. Coconino NF's plan monitoring questions, monitoring methods, units of measure, and frequency of measurements

Question Number	Questions	Scale	Possible Methods and Data Sources	Monitoring Frequency	Evaluation and Reporting Frequency	Data Precision and Reliability
Maintenance and Improvement of Ecosystem Health						
1	What are the status and trends for the State of Arizona's air quality standards in airsheds that overlap the Coconino NF?	Forest	Particulate matter data from local ADEQ air quality monitoring stations (Camp Verde, Cottonwood, Flagstaff)	Daily	Annually	A
2	What are the status and trends for the visibility of the Sycamore Wilderness Class I Area?	Greater than forestwide	Data from IMPROVE[1] program (ADEQ air quality monitoring station at Ike's Backbone)	Weekly	Annually	B
3[2]	How much have management activities contributed to maintaining or making progress toward DCs related to overstory and understory vegetation structure and composition for terrestrial vegetation types? Particular focus in answering this question should be given to the following PNVTs: Semidesert Grasslands, Piñon-Juniper Evergreen Shrub, Ponderosa Pine, Mixed Conifer with Frequent Fire, and Piñon-Juniper with Grasslands[3].	PNVT	FACTS and INFRA databases; stand exam data; FIA plots; change in species composition and cover frequency (range monitoring data); and acres of restored grassland.	Every 1–5 years	Every 5 years	A, B
4[2]	How much have management activities contributed to maintaining or making progress toward fire regime condition class for terrestrial vegetation types? Particular focus in answering this question should be given to the following PNVTs: Semidesert Grasslands, Ponderosa Pine, Mixed Conifer with Frequent Fire, and Piñon-Juniper with Grass.	PNVT	FACTS database	Every 5 years	Every 5 years	A, B

Question Number	Questions	Scale	Possible Methods and Data Sources	Monitoring Frequency	Evaluation and Reporting Frequency	Data Precision and Reliability
5[2]	How much have management activities made progress toward achieving desired conditions for wetland/cienega, stream riparian areas, and springs, including reducing the incidence or abundance of aquatic invasive species? Focus should include functional-at-risk or nonfunctional riparian and wetland areas.	PNVT	Monitor ground-disturbing activities' effect on riparian function for a subset of projects; proper functioning condition (PFC) data methodology; surveys and reports, including partner agencies and organizations (e.g., Fossil Creek native fish annual monitoring report); data on miles of streams/acres of lakes/pond of nonnative species removal, number of sites or acres of new nonnative populations, etc. Information from State and Federal agencies on new populations of aquatic invasive species.	1–5 years where management activities have been implemented at a scale that may result in a change in PFC	5 years	B
6[2]	How much have management activities contributed to maintaining wetland/cienega and stream riparian areas and springs that were identified in proper functioning condition (PFC)?	PNVT	Monitor ground-disturbing activities' effect on riparian functional condition for a subset of projects; PFC data methodology.	10 years	10–15 years	B
7[2]	How has the scale and severity of disturbance (e.g., wildfire, insects and disease) contributed to the maintenance of or progress toward DCs? (1982 Planning Rule (sec. 219.12(k)(4)(iv))	PNVT or 6th code watershed	Forest health surveys and reports, stand exams, project inspections and reviews, remote sensing, incident mapping for wildfire, large fire occurrence map, surveys and reports	1–5 years	Every 5 years.	A, B

Question Number	Questions	Scale	Possible Methods and Data Sources	Monitoring Frequency	Evaluation and Reporting Frequency	Data Precision and Reliability
8[2]	Are management activities improving long-term soil health and productivity (Semidesert Grasslands, Great Basin Grasslands, Piñon-Juniper Evergreen Shrub, Piñon-Juniper with Grass, Ponderosa Pine, and Mixed Conifer with Frequent Fire)?	PNVT	Soil condition assessments, soil disturbance protocols, vegetation groundcover transects	Every 3–5 yrs.	Every 5 yrs.	A
9	As indicators of water quality, what are the status and trends for aquatic species in cold water streams (i.e., aquatic macroinvertebrates—an ecological indicator)?	Streams	ADEQ water quality monitoring data for aquatic macroinvertebrates	Every 3 yrs.	Every 3 yrs.	A
10	How much are management activities contributing to DCs or maintaining watersheds in a healthy state? Particular focus in answering this question should be given to priority 6th code watersheds identified in the watershed condition assessment.	6th code watershed	6th code Watershed Condition Assessment Tracking Tool (WCATT)	Annually	Every 5 years	B
11[2]	Are terrestrial and aquatic habitats for threatened and endangered species being maintained or enhanced to meet recovery objectives?	Forest	Review of implementation and effectiveness of project mitigation measures affecting habitat; NRIS database; pre-project surveys; survey results from wildlife agencies; research studies; NRIS database; results from other monitoring questions related to habitat for these species; stand exams; FIA data.	1–5 years	Every 5 years	A, B

Question Number	Questions	Scale	Possible Methods and Data Sources	Monitoring Frequency	Evaluation and Reporting Frequency	Data Precision and Reliability
12[2]	How have management activities influenced population trends, habitat quality and quantity, and trends of management indicator species (i.e., pronghorn, Mexican spotted owls (MSO)[4], pygmy nuthatch)? Pronghorn habitat includes Great Basin Grasslands and Montane Grasslands. Semidesert Grasslands, and Ponderosa Pine. MSO habitat includes Ponderosa Pine (Gambel oak subtype), Mixed Conifer with Frequent Fire, and Mixed Conifer with Aspen. Habitat for the pygmy nuthatch includes Ponderosa Pine (old growth and snags).	Forest	Review AZGFD breeding bird and pronghorn surveys; MSO monitoring per recovery plan; ongoing bird monitoring (e.g., Rocky Mountain Bird Observatory)	Every 5 years	Every 5 years	A, B
13[2]	How have management activities improved the quality and quantity of aspen (an ecological indicator)?	Forest	Southwestern Region forest health monitoring, Flagstaff District volunteer program.	Every 3 years	Every 3 years	A, B
14	Have lands not suited for timber been re-examined to determine if suitability has changed (and suitable lands returned to timber production)? (sec. 219.12(k)(4)(ii))	Forest	Reapply timber suitability criteria and process. FACTS database.	Every 10 years	Every 10 years	A, B
15	Are forest and woodland stands adequately restocked within 5 years of final harvest treatment? (sec. 219.12(k)(4)(i)); should maximum size limits for harvest areas be continued? (sec. 219.12(k)(4)(iii))	Forest	Review annual reforestation needs report, stocking certifications, silvicultural prescriptions, and timber/silviculture tracking database. FACTS database.	1–5 years	Every 5 years	A, B

Question Number	Questions	Scale	Possible Methods and Data Sources	Monitoring Frequency	Evaluation and Reporting Frequency	Data Precision and Reliability
Recreation						
16	Are objectives for recreation settings and opportunities being achieved?	Forest	Miles and type of trails provided (INFRA database), NVUM (satisfaction questionnaire results)	Every 5 years	Every 5 years	A, B
17	How are projects and programs making progress toward scenic integrity DCs in areas not meeting scenic integrity objectives?	Forest	Project implementation monitoring and tracking in areas not meeting scenic integrity objectives (identified in the environmental impact statement for the plan).	Upon completion of project implemen-tation.	Every 5–10 years	B
Other						
18	Have there been changes that have resulted in unforeseen issues requiring plan amendments? (sec. 219.12(k))	Forest	Review the number of plan amendments and conduct a content analysis on those amendments.	Every 5 years	Every 5 years	B
19	Are the plan desired conditions, standards, and guidelines (including best management practices) being incorporated in NEPA documents and implemented on the ground? (sec. 219.12(k))	Forest	Review a subset of NEPA decision documents. Conduct management reviews on selected newly implemented and ongoing activities relative to compliance with the associated NEPA decision.	Every 1–2 years	Every 1–2 years	B
20	How do actual accomplishments compare with plan objectives? (comparison of projected and actual outputs and services. (sec. 219.12(k)(1))	Forest	Annual accomplishment reports	Annually	Every 5 years	B

Question Number	Questions	Scale	Possible Methods and Data Sources	Monitoring Frequency	Evaluation and Reporting Frequency	Data Precision and Reliability
21	How have the plan components, objectives, and management approaches affected land, resources, and communities adjacent to or near the Coconino NF? (sec. 219.7(f))	"All-lands" stakeholders, to include Federal agencies, State and local governments, and tribes.	Coordinate with stakeholders to review effects of Coconino NF management. Review stakeholders' new or revised plans or policies for alignment or conflicts with plan direction.	Every 1–2 years	Every 5 years	B
22	How have the management of activities on nearby lands managed by other Federal or government agencies or under the jurisdiction of local governments affected Coconino NF management? (sec. 219.7(f))	"All-lands" stakeholders, to include Federal agencies, State and local governments, and tribes.	Review conflicts identified with management activities on nearby lands managed by other Federal or government agencies or under the jurisdiction of local governments.	Every 1–2 years	Every 5 years	B

[1] The Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring program was established in 1985 to aid the creation of Federal and State implementation plans for the protection of visibility in Class I areas (156 national parks and wilderness areas) as stipulated in the 1977 amendments to the Clean Air Act.

[2] See table 17 for supplementary information that clarifies which PNVTs and monitoring information may be applicable to particular monitoring questions.

[3] These PNVTs were identified as being of concern with respect to departure from reference conditions and trend for vegetation structure in the "Ecological Sustainability Report" (Forest Service, 2009) and are expected to be influenced by Coconino NF management.

[4] Information gathered in conjunction with meeting the "Mexican Spotted Owl Recovery Plan" should be used to monitor Mexican spotted owl (MSO) population and habitat trends. If that information is not available, this monitoring item may be accomplished by evaluating accumulated project level owl occupancy and habitat information.

Supplemental Monitoring Information

The supplemental information found below (table 17) is intended to further clarify what types of information may be used to answer monitoring questions that are related to potential natural vegetation types (PNVTs), management indicator species (MIS), and threatened and endangered species (T&E). PNVTs to be monitored were identified for each column based on whether there were plan objectives tied to those areas (noted with OBJ) or whether they provide habitat associated with species to be monitored (noted with MIS or T&E). These PNVTs may be changed if species are delisted or added. Objectives that were not specifically tied to PNVTs were not included but may be used to address monitoring questions as appropriate.

Table 17. Supplemental information to clarify PNVTs and additional information applicable to monitoring questions

Question Number	Monitoring Questions	PFC Monitoring an a Subset of Ground-Disturbing Activities[1]	Long-term Soil Health and Productivity[2]	Overstory and Understory Structure and Composition[3]
3	How much have management activities contributed to maintaining or making progress toward desired conditions related to overstory and understory vegetation structure and composition for terrestrial vegetation types? Focus on objectives, T&E.			X
4	How much have management activities contributed to maintaining or making progress toward fire regime condition class for terrestrial vegetation types?			X Particular focus in answering this question should be given to the following PNVTs: Semidesert Grasslands, Ponderosa Pine, Mixed Conifer with Frequent Fire, and Piñon-Juniper with Grass
5	How well have management activities contributed to maintaining or making progress toward wetland/cienega, stream riparian areas, and springs DCs, including reducing the incidence or abundance of aquatic invasive species? Focus should include functional at risk or nonfunctional riparian and wetland areas?	X		
6	How much have management activities contributed to maintaining wetland/cienega and stream riparian areas, streams that were identified in proper functioning condition?	X		

Question Number	Monitoring Questions	PFC Monitoring an a Subset of Ground-Disturbing Activities[1]	Long-term Soil Health and Productivity[2]	Overstory and Understory Structure and Composition[3]
7	How has the scale and severity of disturbance (e.g., wildfire, insects and disease) contributed to the maintenance of or progress toward DCs? (sec. 219.12(k)(4)(iv))			X
8	Are management activities improving long-term soil health and productivity?		X	
11	Are terrestrial and aquatic habitats for threatened and endangered species being maintained or enhanced to meet recovery objectives?	X		X (May include FRCC as another source of information.)
12	How have management activities influenced population trends and habitat quality, quantity, and trends of management indicator species? (Also includes other agency information.)		X (Montane and Great Basin Grasslands for pronghorn)	X (Montane and Great Basin Grasslands for pronghorn; Ponderosa pine for pygmy nuthatches; and Ponderosa Pine-Gamble Oak subtype, Mixed Conifer with Frequent Fire, and Mixed Conifer with Aspen for Mexican spotted owl)
13	How have management activities improved the quality and quantity of aspen, an ecological indicator.			X

[1] PFC=Proper Functioning Condition. This question may apply to Wetland/Cienega (OBJ), Cottonwood Willow Riparian Forest (T&E), Mixed Broadleaf Riparian Forest (T&E), Montane Willow Riparian Forest (T&E), Springs (OBJ), stream aquatic habitats (any PNVT) (OBJ), and stream riparian habitats (any PNVT) (OBJ).

[2] Unless otherwise specified, this question may apply to Semidesert Grasslands (OBJ), Great Basin Grasslands (MIS, OBJ), Piñon-Juniper Evergreen Shrub (OBJ), Piñon-Juniper with Grass (OBJ), Ponderosa Pine (OBJ), Mixed Conifer with Frequent Fire (OBJ), and Montane Grasslands (MIS).

[3] This includes changes in fire regime condition class and changes resulting from wildfires and insect and disease outbreaks outside of historic range of variability. Unless otherwise specified, this question may apply to Desert Communities (T&E), Alpine Tundra (T&E), Great Basin Grassland (OBJ), Semidesert Grassland (OBJ), Aspen and Maple (OBJ), Piñon-Juniper Evergreen Shrub (OBJ), Piñon-Juniper with Grass (OBJ), Ponderosa Pine (OBJ, MIS), Ponderosa Pine (Gambel Oak subtype) (T&E, MIS), Mixed Conifer with Frequent Fire (T&E, OBJ), and Mixed Conifer with Aspen (T&E).

List of Preparers

Following is a list of the names, titles, and education and professional experience of individuals who contributed substantially to development of the "Draft Land and Resource Management Plan for the Coconino National Forest."

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Glossary

Accessibility – According to section 504 of the Rehabilitation Act of 1973 (P.L. 93-112), all Federal programs and facilities are required to be "to the highest degree feasible, readily accessible to and usable by all persons who have a disability, including mobility, visual, hearing, or mental impairments."

Adaptive management – The process of implementing policy decisions incrementally, so that changes can be made if the desired results are not being achieved. Adaptive management is a process similar to a scientific experiment in that predictions and assumptions in management plans are tested, and experience and new scientific findings are used as the basis to improve resource management practices and future planning.

Administrative site – A site used by the Forest Service for the administrative activities such as offices, storage, and interpretive centers.

Age class – Refers to trees that originated within a relatively distinct range of years. Typically the range of years is considered to fall within 20 percent of the average natural maturity (e.g., if 100 years is required to reach maturity, then there would be five 20-year age classes).

Allotment – A designated area available for livestock grazing upon which a specified number, kind of livestock, and season of use may be grazed under a term grazing permit. The basic land unit used to facilitate management of the range resource on National Forest System and associated lands administered by the Forest Service.

Basal area – The cross-sectional area at breast height (4.5 feet above the ground) of trees measured in square feet. Basal area is a way to measure how much of a site is occupied by trees. The cross-sectional area is determined by calculating the tree's radius from its diameter (diameter/2 = radius) and using the formula for the area of a circle (π x radius^2 = cross-sectional area). Basal area per acre is the summation of the cross-sectional area of all trees in an acre or in a smaller plot used to estimate basal area per acre. Diameter at root collar (defined below) is used to calculate the cross-sectional area of multistemmed trees such as juniper and oak.

Base for exchange lands – National forest lands available for exchange to other landowners (see definition for land adjustments).

Bedload – Sand, silt, gravel, soil, or detritus, carried by a stream on or immediately above the bottom.

Best management practices (BMPs) – With respect to water resources, the method, measure, or practice selected by an agency to meet its nonpoint-source pollution control needs. BMPs include, but are not limited to, structural controls, operations, and maintenance procedures. BMPs can be applied before, during, or after pollution-producing activities to reduce or eliminate the introduction of pollutants into the water.

Biological soil crusts – Crusts of soil particles formed by living organisms (e.g., algae, mosses, lichens) in arid areas. They hold soil in place, help retain moisture, and improve soil nutrients by fixing atmospheric nitrogen.

Class I Area – Under the Clean Air Act of 1963, a Class I area is one in which visibility is protected more stringently than under the national ambient air quality standards; it includes

national parks, wilderness areas, monuments, and other areas of special national and cultural significance.

Climax (seral stages) – The stage where an ecosystem has reached a steady state. Through the process of ecological succession, an equilibrium is reached in which the biological community is best adapted to the average conditions in that area.

Clump – Refers to a tight cluster of two to five trees of similar age and size originating from a common rooting zone that typically lean away from each other when mature. A clump is relatively isolated from other clumps or trees within a group of trees, but a stand-alone clump of trees can function as a tree group.

Coarse woody debris – Woody material on the ground greater than 3 inches in diameter, including logs.

Concern Level roads – Concern Level 1 roads are travel routes where forest visitors have a high interest in scenic qualities. Concern Level 2 roads are travelways where forest visitors have a moderate interest in scenic qualities.

Condition class – The Forest Service Manual (FSM 2521.1) uses three classes to describe watershed condition:

- **Class 1** watersheds exhibit high geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are functioning properly.
- **Class 2** watersheds exhibit moderate geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are functioning at risk.
- **Class 3** watersheds exhibit low geomorphic, hydrologic, and biotic integrity relative to their natural potential condition and are impaired function.

Constructed feature – Anything constructed by the Forest Service or by a permittee for use in administering National Forest System lands. When used in the context of scenery, the term refers to anything that is built in the landscape.

Cultural resources overview – A study of published and unpublished documents, records, files, registers, and other sources, resulting in analysis and synthesis of all reasonably available data. A cultural resources overview encompasses prehistoric, historic, and ethnological/sociological elements and, in large part, chronicles past land uses. It may have major relevance to current land use decisions.

Declining – Refers to the senescent (i.e., aging) period in the lifespan of plants that includes the presence of dead and/or dying limbs, snag tops, and other characteristics that indicate their later life stages.

Designated road, trail, or area – Routes and areas designated on the motor vehicle use map and established by a decision that is compliant with the 2005 Travel Management Rule.

Designated special uses – Legally mandated designation by states and tribes of water uses to be achieved and protected. Appropriate uses are identified by taking into consideration the use and value of the water body for public water supply; protection of fish, shellfish, and wildlife; and

recreational, agricultural, industrial, and navigational purposes. In designating uses for a water body, states and tribes examine the suitability of a water body for the uses based on the physical, chemical, and biological characteristics of the water body, its geographical setting and scenic qualities, and economic considerations.

Desired landscape character – Described in the Scenery Management System Handbook as, "The most complete, attractive and sustainable expression of the desired landscape character which is compatible with that landscape's fully integrated set of desired conditions" (Handbook page 5-5 expanded). Desired landscape character represents the most "ideal" and attractive scenic identity that is possible, given the limitations of the ecosystem and achievement of other resource objectives as defined in the desired conditions.

Developed recreation – Recreation that occurs at human-made developments such as campgrounds, picnic areas, resorts, ski areas, and trailheads. Facilities might include: roads, parking lots, picnic tables, toilets, drinking water, ski lifts, and buildings. Campgrounds and picnic areas are examples of developed recreation sites.

Developed recreation site – A distinctly defined area where facilities are provided for concentrated public use (e.g., campgrounds, picnic areas, or swimming areas).

Diameter at breast height (d.b.h.) – The diameter of a tree typically measured at 4.5 feet above ground level.

Dispersed camping – Camping outside of a developed camping facility.

Dispersed recreation – The type of outdoor recreation that tends to be spread out over the land and in conjunction with roads, trails, and undeveloped waterways. Activities are often day-use oriented and include hunting, fishing, boating, hiking, off-road vehicle use, cross-country skiing, mountain biking, and rock climbing

Easement – The right of use over the property of another. The land having the right of use is known as the dominant estate and the land that is subject to the easement is known as the servient estate.

Ecosystems – Spatially explicit, relatively homogeneous units of the Earth that include all interacting organisms and elements of the abiotic environment within its boundaries. An ecosystem is commonly described in terms of its:

- **Composition** – the biological elements within the different levels of biological organizations, from genes and species to communities and ecosystems.
- **Structure** – the organization and physical arrangement of biological elements such as snags and down woody debris, vertical and horizontal distribution of vegetation, stream habitat complexity, landscape pattern, and connectivity.
- **Function** – ecological processes, such as energy flow; nutrient cycling and retention; soil development and retention; predation and herbivory; and natural disturbances such as wind, fire, and floods that sustain composition and structure.

Ecotone – A transition zone between two distinct ecological communities.

Effective vegetative groundcover – The amount of live plant growth (vegetative basal area) plus dead, unattached organic matter (litter) over an area of ground that provides adequate protection from erosion, drought, and other ecological disturbances.

Effective vegetation – A level of natural herbaceous composition that is required to successfully meet a desired management result and/or ecosystem character. The desired level of herbaceous composition may include both qualitative and quantifiable measures.

Emergent vegetation – Aquatic plants with some or most of the leaf area extending out of the water.

Endemic – A plant or animal species whose natural occurrence is confined to a certain region and whose distribution is relatively limited.

Erosion – The processes whereby earthy or rocky material is worn away, loosened, dissolved, and removed from any part of the Earth's surface.

Erosion hazard – The risk of erosion and sedimentation that is based on slope, soil type, and the amount and type of material on the ground that is able to trap eroded material.

Ethnobotany – The study of the uses of plants by different cultures such as food, medicinal, tool, and ceremonial purposes.

Even-aged stands – Tree stands that are comprised of one distinct age class of trees.

Facility – Structures needed to support the management, protection, and use of the national forests including roads, trails, buildings, utility systems, dams, and other construction features. There are three types of facilities: recreation, administrative, and permittee.

Federally listed species – A species listed under the provisions of the Endangered Species Act.

Fire intensity – Fire intensity represents the energy released during the phases of combustion. This matrix includes measures of the amount of heat produced by the flaming front, the residence time or the amount of time that the heat is present at a given location, and the rate at which the flaming front is progressing. These three measures directly influence the vegetative effects that the fire will produce. A low intensity fire refers to a flaming front that is progressing at a rate in which the amount of heat produced and residence time do not result in highly damaging vegetative effects (Keely, 2009).

Fire regime – Refers to the patterns of fire that occur over a long period of time across an appropriately scaled area and its immediate effects on the ecosystem in which it occurs. An ecosystem's natural fire regime is the one that existed prior to human-facilitated interruption of fire frequency, extent, or severity. There are five fire regimes which are classified based on frequency (i.e., average number of years between fires) and severity (i.e., amount of replacement on the dominant overstory vegetation) of the fire. These five regimes are:

- **Fire Regime I** – 0 to 35 year frequency and low (surface fires most common, isolated torching can occur) to mixed severity (< 75 percent of dominant overstory vegetation replaced);
- **Fire Regime II** – 0 to 35 year frequency and high severity (> 75 percent of dominant overstory vegetation replaced);

- **Fire Regime III** – 35 to 100+ year frequency and mixed severity;
- **Fire Regime IV** – 35 to 100+ year frequency and high severity; and
- **Fire Regime V** – 200+ year frequency and high severity.

Fire severity – A measure of the direct effects of the fire on vegetation. Low severity generally replaces less than 25 percent of the dominant overstory vegetation. Mixed-severity fires may replace up to 75 percent of the dominant overstory vegetation, and high-severity fires are considered those that replace more than 75 percent of the dominant overstory vegetation. (FRCC Guidebook, 2010)

Flood plain – That portion of a stream valley, adjacent to the channel, which is covered with water when the stream overflows its banks at flood stages.

Forage – All browse and nonwoody plants that are available to livestock or game animals for grazing or harvesting for feeding. The weight may be expressed as green, air dry, or oven dry. The term may also be modified as to time of production such as annual, current year's, or seasonal forage production.

Forb – Any herbaceous broad-leaved plant species.

Foreground – A term used in the Scenery Management System to denote the area within 300 feet to half a mile of a site or boundary.

Forest (wood) products – Any resource derived from trees except lumber. This includes seeds, nuts, firewood, biomass, and other related products.

Forest Service Handbook (FSH) – Forest Service Handbooks are the principal source of specialized guidance and instruction for carrying out the direction issued in the FSM. Specialists and technicians are the primary audience of handbook direction. Handbooks may also incorporate external directives with related USDA and Forest Service directive supplements.

Forest Service Manual (FSM) – The Forest Service Manual contains legal authorities, objectives, policies, responsibilities, instructions, and guidance needed on a continuing basis by Forest Service line officers and primary staff in more than one unit to plan and execute assigned programs and activities.

Fragmentation – A process that occurs wherever a large, contiguous habitat is transformed into smaller patches that are isolated from each other by a landscape unlike the original. This landscape can differ from the original habitat in either composition or structure, and it functions as either a partial or total barrier to the distribution of the species associated with the original habitat. A major threat to the viability of wildlife species is when fragmentation leads to the isolation of pairs and populations.

Free flowing – Defined by the National Wild and Scenic River Act of 1968 (P.L.90-542) as "existing or flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway. The existence, however, of low dams, diversion works, and other minor structures at the time any river is proposed for inclusion in the national wild and scenic rivers system shall not automatically bar its consideration for such inclusion…."

Free thinning – The silvicultural management technique that thins trees within an area of the forest through the release of selected crop trees based on desired crown position, bole quality, and spacing.

Friable – Rock types which are fragile, crumbly, or easily reduced to grainy particles.

Fugitive dust – Particles lifted into the ambient air caused by human-made and natural activities such as the movement of soil, vehicles, equipment, blasting, and wind. This excludes particulate matter emitted directly from the exhaust of motor vehicles and other internal combustion engines; from portable brazing, soldering, or welding equipment; and from piledrivers.

Functioning ecosystem – An ecosystem that contains all components and processes necessary to maintain resilience over time.

Gap – Refers to the space occurring in a forested area as a result of individual or group tree mortality from small disturbance events or from local site factors such as soil properties that influence vegetation growth patterns.

Geomorphology – The classification, description, nature, origin, and development of present landforms and their relationships to underlying structures and of the history of geologic changes as recorded by these surface features.

Grazing permittee – An individual who has been granted written permission to graze livestock for a specific period on a range allotment.

Ground-disturbing activities – An activity which moves soil to the extent where an archaeological site may be impacted.

Groundwater recharge – Recharge is the process by which groundwater is replenished. A recharge area is where water from precipitation is transmitted downward to an aquifer. Recharge is promoted by natural vegetation cover, flat topography, permeable soils, a deep water table, and the absence of confining beds.

Groups – A cluster of two or more trees with interlocking or nearly interlocking crowns at maturity surrounded by an opening. Size of tree groups is typically variable depending on forest type and site conditions and can range from fractions of an acre (a two-tree group) (i.e., ponderosa pine, dry mixed conifer) to many acres (i.e., wet mixed conifer, spruce-fir). Trees within groups are typically nonuniformly spaced, some of which may be tightly clumped.

Group selection – An uneven-aged management method in which trees are removed and new age classes are established in groups, adjacent to other groups of different age classes. Group cut size is determined by the reproduction requirements of the species desired and the number or total acreage of different age classes desired across the stand.

Group site – A recreation site designed to accommodate group events such as family gatherings.

Heritage asset – Property, plant, and/or equipment that are unique for one or more of the following reasons: historical or natural significance; cultural, educational, or artistic importance; or significant architectural characteristics.

Hydrologic unit code (HUC) – Hydrologic unit codes are a way of identifying all of the watersheds in the U.S. in a nested arrangement from largest to smallest. Each hydrologic unit is identified by a code. The Coconino NF extends across seven 4th code watersheds which drain into the Little Colorado River basin to the east or the Verde River basin to the west. Each 4th code watershed is comprised of smaller 5th code watersheds which, in turn, are comprised of even smaller 6thcode watersheds.

Hydrology – The study of the behavior of water in the atmosphere, on the Earth's surface, and underground.

Immediate foreground – A term used in the Scenery Management System to denote the area within 0 to 300 feet of a site or boundary.

Improvement – Human-made developments such as roads, trails, fences, stock tanks, pipelines, power and telephone lines, survey monuments, and ditches.

Inclusion – A variance in vegetation within a vegetation type due to landform, moisture regime, soil type, erosion, or past disturbance.

Infiltration – The process of water entering the soil. The rate of infiltration is the maximum velocity at which water enters the soil surface.

Integrated pest management approach – A broad-based ecological approach to structural and agricultural pest control that integrates pesticides/herbicides into a management system, incorporating a range of practices for economic control of a pest.

Intermittent/ephemeral stream – An intermittent or ephemeral stream or stretch of a stream is one that flows only in direct response to precipitation. It receives no water from springs and no long-continued supply from melting snow or other source. Its stream channel is at all times above the water table. The term may be arbitrarily restricted to streams or stretches of streams that do not flow continuously during periods of as much as 1 month.

Interpretation – Information services designed to present inspirational, educational, and recreational values to forest visitors to provide the utmost in understanding, appreciation, and enjoyment from their forest experience.

Invasive species – Any species that is nonnative (or alien) to the forest and whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.

Inventoried roadless area (IRA) – Areas, typically of 5,000 acres or greater, which were identified in the Roadless Area Review and Evaluation in 1979.

Land exchange – The conveyance of non-Federal land or interest in the land to the U.S. in exchange for National Forest System land or interest in the land.

Land purchase – The conveyance of non-Federal land or interest in the land to the U.S. by fee-simple purchase.

Leasable minerals – Leasable minerals are not locatable and are subject to leasing under the Mineral Leasing Act and include oil, gas, gypsum, and geothermal. By the lease terms, the lessee has the legal right to drill or mine subject only to the terms and conditions of the lease.

Litter – The uppermost layer of organic debris on the ground, composed mainly of fresh or slightly decomposed leaves, bark, twigs, flowers, fruits, and other vegetative matter.

Livestock utilization – Grazing pastures with cattle, sheep, or other domestic animals.

Locatable minerals – Locatable minerals are minerals that are regulated under the provisions of the 1872 Mining Law and include gold, silver, uranium, and many others. Locatable mineral uses can occur unless the lands are withdrawn from mineral entry.

Management indicator species (MIS) – Plant or animal species or habitat components selected in the planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important.

Memorandum of understanding (MOU) – A legal agreement between the Forest Service and other agencies resulting from consultation between agencies that states specific measures the agencies will follow to accomplish a large or complex project. A MOU is not a fund obligating document.

Mineral materials – A collective term used to describe petrified wood and common varieties of sand, gravel, stone, pumice, pumicite, cinders, clay, and other similar materials. Common varieties do not include deposits of those materials which are valuable because of some property giving them distinct and special value (36 CFR228.42). The determination of which minerals are considered common variety is made by the Bureau of Land Management.

Mineral withdrawal – Mineral withdrawal reserves public lands from entry by leasable or locatable mineral entry. To request a mineral withdrawal, the Forest Service must submit a request and documentation to the Bureau of Land Management.

Mosaic – The pattern of patches, corridors, and matrices (forest or non-forest) that form a landscape in its entirety.

Motor vehicle use map (MVUM) – A map displaying designated roads, trails, and areas for motor vehicle use on an administrative unit or a ranger district of the National Forest System.

National Environmental Policy Act (NEPA) – An act declaring a National policy to encourage productive and enjoyable harmony between people and their environment, to promote efforts which will prevent or eliminate damage to the environment and the biosphere and stimulate the health and welfare of people, to enrich the understanding of the ecological systems and natural resources important to the Nation, and to establish a Council on Environmental Quality (P.L. 91-190).

National forest land and resource management plan – A plan developed to meet the requirements of the Forest and Rangeland Renewable Resources Planning Act of 1974 (P.L. 93-378) , as amended, that guides all resource management activities and establishes management standards and guidelines for National Forest System lands of a given national forest.

National Forest System (NFS) lands – Federal lands that have been designated by Executive Order or statute as national forest, national grasslands, or purchase units, or other lands under the administration of the Forest Service.

National historic trail – National historic trails were authorized under the National Trails System Act of 1968 (P.L. 90-543) along with national scenic trails and national recreation trails. National scenic trails and national historic trails may only be designated by an act of Congress.

National Register of Historic Places – A list of heritage resources that have local, state, or national significance maintained by the Secretary of the Interior.

Native species – All indigenous, terrestrial, and aquatic species that evolved naturally in an ecosystem.

Natural fire regime – The fire regime that existed prior to human-facilitated interruption of frequency, extent, or severity.

Niche – The locality where an organism may generally be found and where all essentials for its development and existence are present. Habitat niches are described by their geographical boundaries, or with terms such as “shady woodlands,” “banks of streams,” and “dry hillsides.”

Northern goshawk foraging areas – The areas that surround the PFAs (see below) that northern goshawks use to hunt for prey. They are approximately 5,400 acres in size.

Northern goshawk nest areas – The areas immediately around a nest that are used by northern goshawks in relation to courtship and breeding activities. They are approximately 30 acres in size and contain multiple groups of large, old trees with interlocking crowns.

Northern goshawk post-fledgling areas (PFAs) – The areas that surround the nest areas. They represent an area of concentrated use by the northern goshawk family until the time the young are no longer dependent on adults for food. PFAs are approximately 420 acres in size (not including the nest area acres).

No surface occupancy – A fluid mineral leasing stipulation that prohibits occupancy or disturbance on all or part of the land surface to protect special values or uses. The NSO stipulation includes stipulations that may have been worded as “No Surface Use/Occupancy,” “No Surface Disturbance,” “Conditional NSO,” and “Surface Disturbance or Surface Occupancy Restriction by location.” Lessee may exploit the oil and gas or geothermal resources under leases restricted by this stipulation through use of directional drilling from sites outside the NSO area.

Noxious weed – A legal term applied to plants regulated by Federal and state laws, such as plants designated as noxious weeds by the Secretary of Agriculture or by the responsible state official. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insect or disease, and being not native or new or not common to the U.S. or parts thereof.

Nurse trees – Larger, faster growing trees that shelter smaller, slower growing trees or plants.

Off-highway vehicle – Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other natural terrain.

Old growth – Old growth in southwestern forested ecosystems is different than the traditional definition based on northwestern infrequent fire forests. Due to large differences among forest types and natural disturbances in the Southwest, old growth forests vary extensively in tree size, age classes, presence and abundance of structural elements, stability, and presence of understory.

Old growth refers to specific habitat components that occur in forests and woodlands—old trees, dead trees (snags), downed wood (coarse woody debris), and structure diversity. These important habitat features may occur in small areas, with only a few components, or over larger areas as stands or forests where old growth is concentrated. In the Southwest, old growth is considered "transitional," given that the location of old growth shifts on the landscape over time as a result of succession and disturbance (tree growth and mortality). Some species, notably certain plants, require "old forest" communities that may or may not have old growth components but have escaped significant disturbance for lengths of time necessary to provide the suitable stability and environment.

Openings – Spatial breaks between groups or patches of trees, as large as or larger than groups, that contain grass, forb, shrub, and/or tree seedlings but are largely devoid of big trees, with a total tree cover of less than 10 percent in openings.

Open pit – A shallow human-made open pond or pit used on a drill site or production pad to hold produced water or fluids from drilling. "Closed" pits refer to the use of tanks to store these types of fluids.

Outstandingly remarkable values (ORVs) – Scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values which make a river eligible for designation as a wild or scenic river.

Overland flow – A condition in which the precipitation rate is faster than the infiltration rate, and excess water runs over the surface of land.

Overlay – A management area or special area that provides more specific direction for a small geographic location within a larger management area. The direction of the larger management area continues to apply. For example, if proposing a project next to the wild and scenic portion of the Verde River, a specialist would have to look at direction for wild and scenic rivers and the Verde Valley Management Area in addition to the forestwide direction.

Overstory – That portion of a plant community consisting of the taller plants on the site; the forest or woodland canopy.

Patches – Areas larger than tree groups in which the vegetation composition and structure are relatively homogeneous. Patches comprise the mid-scale, thus they range in size from 100 to 1,000 acres.

Perennial stream – Permanently inundated surface stream course. Surface water flows throughout the year except in years of infrequent drought.

Planned ignition – A fire ignited by management actions under certain predetermined conditions to meet plan desired conditions. Prescribed fire is a synonymous term.

Potential natural vegetation type (PNVT) – The plant community that would become established if all successional sequences were completed without human interference under present environmental and floristic conditions, including those created by humans.

Prescribed fire – Fire burning under conditions specified in an approved plan to dispose of fuels, control unwanted vegetation; stimulate growth of desired vegetation; change successional stages; and to meet range, wildlife, recreation, wilderness, watershed, or timber management objectives.

Prescribed burns occur under specified environmental conditions that allow the fire to be confined to a predetermined area and produce the fireline intensity and rate of spread required to meet management objectives.

Priority heritage assets (PHAs) – Heritage assets of distinct public value that are, or should be, actively maintained. The significance and management of a PHA must meet one or more of the following criteria: (1) recognized through an official designation such as a listing on the National Register of Historic Places, State Register, and so forth; (2) recognized through prior investment in preservation, interpretation, and use; (3) recognized in an agency approved management plan; or (4) exhibits critical deferred maintenance, which is defined as a potential health or safety risk, or imminent threat of loss of significant resource values. Any improvement to a PHA that meets real property designation criteria is now considered real property.

Probable Fossil Yield Classification – A system used to classify geologic units based on the relative abundance of vertebrate fossils or scientifically significant invertebrate (or plant) fossils and their sensitivity to adverse impacts, with a higher class number indicating a higher potential. The Probable Fossil Yield Classification system is meant to provide baseline guidance for predicting, assessing, and mitigating paleontological resources.

- **Class 1** – Igneous and metamorphic (ashes are excluded from this category) geologic units that are not likely to contain recognizable fossil remains.
- **Class 2** – Sedimentary geologic units that are not likely to contain vertebrate fossils nor scientifically significant nonvertebrate fossils.
- **Class 3** – Fossiliferous (fossil containing), sedimentary geologic units whose fossil content varies in significance, abundance, and predictable occurrence. Also sedimentary units of unknown fossil potential.
- **Class 4** – Class 4 geologic units are Class 5 units (see below) that have lowered risks of human-caused adverse impacts and/or lowered risk of natural degradation.
- **Class 5** – Highly fossiliferous geologic units that regularly and predictably produce vertebrate fossils and/or scientifically significant nonvertebrate fossils and that are at risk of natural degradation and/or human-caused adverse impacts.

Proper functioning condition – Riparian-wetland areas are functioning properly when adequate vegetation, landform, or large woody debris is present to: dissipate stream energy associated with high flows (thereby reducing erosion and improving water quality); filter sediment; capture bedload and aid in flood plain development; improve floodwater retention and groundwater recharge; develop root masses that stabilize streambanks; develop diverse ponding and channel characteristics to provide habitat for fish, waterfowl and other uses; and support greater biodiversity.

- **Functional at risk** – Riparian-wetland areas that are in functional condition but an existing soil, water, or vegetation attribute makes them susceptible to degradation.
- **Nonfunctional** – Riparian-wetland areas that clearly are not providing adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and, consequently, are not reducing erosion and improving water quality.

Property classes – A term used in heritage resources management for site types or combinations of site types.

Pushes – A vegetative treatment used in piñon-juniper types in which heavy machinery (e.g., bulldozers) is used to push over trees or chains connected to machinery are used to uproot trees.

Quiet areas – Special areas of the forest open only to foot, horse, or bicycle traffic for the purpose of providing a unique, nonmotorized recreational experience. These areas benefit wildlife by providing relatively untrammeled ecosystems and through stress reduction associated with the absence of noisy sound-scapes.

Receptors – Areas sensitive to air quality impacts where exceeding the Federal or local standard may not be the only limitation or where visibility restrictions are important.

Recreation Opportunity Spectrum (ROS) – A framework for stratifying and defining classes of outdoor recreation environments, activities, and experience opportunities. The settings, activities, and opportunities for obtaining experiences are arranged across a continuum or spectrum of six classes: primitive, semiprimitive nonmotorized, semiprimitive motorized, roaded natural, rural, and urban.

- **Primitive** – Characterized by an essentially unmodified natural environment of a fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within these areas is prohibited. There is an extremely high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of outdoor skills in an environment that offers a high degree of challenge and risk.

- **Semiprimitive Nonmotorized** – Nonmotorized back-country area with a predominantly natural-appearing environment, without evidence of resource modification and utilization practices. Provides opportunities for self-reliance and challenge, with a low concentration of users and high degree of interaction with the natural environment. Recreation developments are rustic and rudimentary and primarily provided for the protection of the resources rather than the convenience of users.

- **Semiprimitive Motorized** – Similar setting to semiprimitive nonmotorized except this area provides a motorized back-country experience where trails and primitive roads are designed for high-clearance, four-wheel-drive vehicles. Moderate probability of experiencing solitude. High degree of self-reliance and challenge in using motorized equipment. These areas are predominantly natural, lacking some human modification, except when necessary for site protection.

- **Roaded Natural** – Characterized by a predominantly natural appearing environment with moderate evidence of human activity. Resource modification and utilization practices are evident but harmonize with the natural environment. May have a mosaic of highly modified areas to pockets of unmodified lands. Developed sites provide for some user comfort as well as site protection, but harmonize with the natural environment.

- **Rural** – A substantially modified natural environment. There is evidence of resource modification and utilization practices, and facilities are often designed for larger numbers of people. Campgrounds often include paved roads, electricity, and other conveniences.

- **Urban** – Landscape character that has resulted from extensive human activities, no longer appearing natural, such as conversion of native landscapes into an extensively altered landscape (e.g., a town, city, or metropolitan area).

Reference conditions – Environmental conditions that infer ecological sustainability. When available, reference conditions are represented by the characteristic range of variation (not the total range of variation), prior to European settlement and under the current climatic period. For many ecosystems, the range of variation also reflects human-caused disturbance and effects prior to settlement. It may also be necessary to refine reference conditions according to contemporary factors (e.g., invasive species) or projected conditions (e.g., climate change). Reference conditions are most useful as an inference of sustainability when they have been quantified by amount, condition, spatial distribution, and temporal variation.

Resiliency – The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change.

Restoration – The process of assisting in the recovery of an ecosystem that has been degraded, damaged, or destroyed. Ecological restoration focuses on establishing the composition, structure, pattern, and ecological processes necessary to facilitate terrestrial and aquatic ecosystem sustainability, resilience, and health under current and future conditions.

Riparian – An area of vegetation adjacent to an aquatic ecosystem distinguished by a high water table, certain soil characteristics, and some vegetation that requires free water or conditions that are more moist than normal.

Research natural area (RNA) – An area set aside by the Forest Service to preserve a representative sample of an ecological community, primarily for scientific and educational purposes. Commercial exploitation is not allowed and general public use is discouraged.

Road – A motor vehicle route over 50 inches wide, unless identified and managed as a trail (36 CFR 212.1, FSM 7705).

Roadway – Portion of the road that includes everything from the top of the cut slope to the bottom of the fill slope.

Salable minerals – These minerals are relatively low value per volume; for example: sand, gravel, cinders, common building stone, and flagstone. Many of the materials are used for road surfacing, boulders, and engineering construction or may be specialty resources such as soil amendments or decorative stone, including flagstone. These minerals are typically sold unless used internally, by another government agency, or for ceremonial uses. In these cases they may be provided free of charge.

Scales – The aerial extent of certain plan decisions are described at various scales:

- **Fine scale** is an area of about 10 acres or less at which the distribution of species is described.
- **Mid-scale** is an area of 100 to 1,000 acres composed of assemblages of grouped and individual species which have similar biophysical conditions. An area at this scale is composed of 10 or more fine-scale units.

- **Landscape scale** is a unit of forest land approximately 10,000 acres or greater, typically composed of variable elevations, slopes, aspects, soils, plant associations, and natural ecological processes. An area at this scale is composed of 10 or more mid-scale units.

Scenery – General appearance of a place, landscape, and/or its visible features (USDA Handbook Number 701, "Landscape Aesthetics: A Handbook for Scenery Management," slightly revised for clarity).

Scenic integrity – A measure of the degree to which a landscape is visually perceived to be "complete" and is determined by three factors: dominance, degree of deviation, and intactness of the desired landscape character; it is established based on the existing condition. Scenic integrity disturbances most typically result from human activities but can also result from natural events which exceed the landscape's historic range of variability (HRV) in terms of magnitude, duration, or intensity. An exception to this is direct human alterations that have become accepted over time as positive landscape character attributes (e.g., historic cabins, farms, and ranches).

- **Very High Integrity** – The valued scenery appears natural and unaltered. These areas generally provide for ecological change only. When used as a standard or guideline, this level should be achieved as soon after project completion as possible or within 3 years maximum.
- **High Integrity** – The valued scenery "appears natural or unaltered," yet visual disturbances are present; however, they remain unnoticed because they repeat the form, line, color, texture, pattern, and scale of the valued scenery. When used as a standard or guideline, this level should be achieved as soon after project completion as possible or within 3 years maximum.
- **Moderate Integrity** – The valued scenery "appears slightly altered." Noticeable disturbances are minor and visually subordinate to the valued scenery because they repeat its form, line, color, texture, pattern, and scale. When used as a standard or guideline, this level should be achieved as soon after project completion as possible or within 3 years maximum.
- **Low Integrity** – The valued scenery "appears moderately altered." Visual disturbances are codominant with the valued scenery and may create a focal point of moderate contrast.
- **Very Low Integrity** – The scenery shows obvious human activities of vegetative and landform alterations which dominate the natural landscape but should appear as natural occurrences when viewed at background distances.

Scenic integrity objectives (SIO) – The state of naturalness, or conversely, the state of disturbance created by human activities or alteration. Integrity is stated in degrees of deviation from the existing landscape character in a national forest. (USDA Handbook Number 701, "Landscape Aesthetics: A Handbook for Scenery Management")

Scenic quality – Degree to which the appearance of a place, landscape, or feature can elicit psychological and physiological benefits to individuals and, therefore, to society in general (definition per Scenery Management System Handbook Glossary, revised). Scenic quality is described and measured through the landscape character inventory information and the

cumulative conditions of the two primary Scenery Management System indicators described in this appendix: scenic integrity and scenic stability.

Scoria cone – A cinder cone that, in geological terms, is relatively "young" in age. Scoria cones have bowl-shaped craters and are often found on the landscape in clusters.

Seral stage – One stage in a series of steps in the process of ecological succession.

Significant cave – A cave located on National Forest System lands that has been evaluated and shown to possess features, characteristics, values, or opportunities in one or more of the following resource areas: biota; cultural; geologic-mineralogic-paleontologic; hydrologic; recreational; or educational-scientific for scientific, educational, or recreational purposes; and which has been designated "significant" by the forest supervisor (National Cave Resources Management and Protection Act, P.L. 100-691).

Smoke sensitive areas – Areas in which smoke from outside sources is intolerable for reasons such as heavy population, existing air pollution, or intensive recreation or tourist use.

Snag – A standing dead or partially dead tree (snag topped), often missing many or all limbs. Snags provide essential wildlife habitat for many species and are important for forest ecosystem function.

Soil compaction – Soil compaction occurs when soil particles are pressed together, reducing the pore space between them. This increases the weight of solids per unit volume of soil (bulk density). Soil compaction occurs in response to pressure (weight per unit area) exerted by field machinery or animals. The risk for compaction is greatest when soils are wet.

Soil condition classes – There are four types of soil condition classes: satisfactory, impaired, unsatisfactory, and inherently unstable.

- **Satisfactory** – Indicators signify that soil function is being sustained and soil is functioning properly and normally. The ability of the soil to maintain resource values and sustain outputs is high.
- **Impaired** – Indicators signify a reduction in soil function. The ability of the soil to function properly and normally has been reduced and/or there exists an increased vulnerability to degradation. An impaired category indicates there is a need to investigate the ecosystem to determine the cause and degree of decline in soil functions. Changes in land management practices or other preventative measures may be appropriate.
- **Unsatisfactory** – Indicators signify that a loss of soil function has occurred. Degradation of vital soil functions result in the inability of the soil to maintain resource values, sustain outputs, or recover from impacts. Unsatisfactory soils are candidates for improved management practices or restoration designed to recover soil functions.
- **Inherently Unstable** – These soils have natural erosion exceeding tolerable limits. Based on the universal soil loss equation (USLE), these soils are eroding faster than they are renewing but are functioning properly and normally.

Soil productivity – The capacity of a soil to support the growth of specified plants, plant communities, or a sequence of plant communities. Soil productivity may be expressed in terms of volume or weight/unit, area/year, percent plant cover, or other measures of biomass accumulation.

Special status species – A plant or animal species with either Federal listing as endangered, threatened, candidate, or proposed (under the Endangered Species Act) or listing by the Southwestern Region as sensitive.

Special uses – All use and occupancy on more than a transient basis except those covered by mining laws or associated with harvesting timber or grazing livestock. These uses include roads, all types of utilities, ski areas, cemeteries, electronic sites, and recreation residences. Uses are ordinarily covered by one of two types of permits: either an annual or term permit. Annual permits are for a relatively short-term use and are revocable by the Forest Service. They are renewable each year by the payment of a fee. Term permits are used to cover uses of a longer time period (up to 30 years) and having a large economic investment. Examples of when this permit would be used are large electric transmission lines and large recreation resorts and ski areas.

Stand – A group of trees sufficiently uniform in species composition, size, age, structure, spatial arrangement, and condition to be distinguished from surrounding stands and managed as a single unit.

Streamside management zone – An area of vegetation or forest litter located adjacent to stream courses and/or riparian areas for the purpose of filtering sediment, providing bank stability, and providing shade for fisheries habitat in tree/shrub ecosystems.

Structure (vegetation) – The presence, size, and physical arrangement of vegetation in a stand. Vertical structure refers to the variety of plant heights, from the canopy to the forest floor. Horizontal structure refers to the types, sizes, and distribution of trees and other plants across the land surface. Forest lands with substantial structural diversity provide a variety of niches for different wildlife species.

Successional stage – A stage of development of a plant community as it moves from bare ground to climax. The grass-forb stage of succession precedes the woody shrub stage.

Surface runoff – Refers to the loss of water from an area by flow over the land surface.

Sustainability – A goal for economic development and natural resource management. Ecosystem sustainability is the capacity of an ecosystem for long-term maintenance of ecological processes and functions, biological diversity, and productivity. It is also called ecological sustainability, which generally refers to land management practices that provide goods and services from an ecosystem without degradation of the site quality and without a decline in the yield of goods and services over time.

Terrestrial ecosystem survey (TES) – (Also called terrestrial ecological unit inventory or TEUI.) A classification of ecological types and mapped terrestrial ecological units at a consistent standard throughout National Forest System (NFS) lands. Ecological units are designed to identify land and water areas at different levels of resolution based upon similar capabilities and potentials for response to management and natural disturbances. Capabilities and potentials derive from multiple elements: climate, geomorphology, geology, soils, water, and potential vegetation.

Travertine – A calcium-rich rock composed primarily of calcium carbonate minerals which forms by chemical precipitation from certain types of shallow or surface waters such as springs and rivers; a type of limestone.

Timber production – The process of managing stands of trees within the national forest to maximize woody output. This is not a linear process because other factors must be considered, including, but not limited to: marketable and nonmarketable goods, financial benefits, management practices, and the environmental implications of these management practices.

Total maximum daily load (TMDL) – A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, of which portions of that load are allocated among the various sources of that pollutant.

Trail – A route 50 inches or less in width or a route over 50 inches wide that is identified and managed as a trail (36 CFR 212.1).

Trafficability – The measure of ease and effort it takes for a vehicle or person to travel across the terrain.

Travel Management Rule (TMR) – Located in 36 CFR 212, Subpart B, Designation of Roads, Trails, and Areas for Motor Vehicle Use. The rule requires each national forest or ranger district to designate those roads, trails, and areas open to motor vehicles. Designation will include class of vehicle and, if appropriate, time of year for motor vehicle use. A given route, for example, could be designated for use by motorcycles, off-highway vehicles, or street-legal vehicles. Once designation is complete, the rule will prohibit motor vehicle use off the designated system or inconsistent with the designations. Designations will be shown on a motor vehicle use map. Use inconsistent with the designations will be prohibited.

Understory – Trees occupying the lower level of a stand that has at least two size and age classes.

Uneven-aged forests – Forests that are comprised of three or more distinct age classes of trees, either intimately mixed or in small groups.

Utility corridors – The linear space needed to bury a produced water line, gas pipeline, oil pipeline, electric line, or other line(s). It is often, but not always, located along a road.

Viability – The capacity of living, or being distributed, over wide geographical limits; as in the viability of a species.

Vigorous – Growing at or near full capacity; resilient, not suppressed.

Water rights and claims – Certified water rights are legally recognized water rights that document how much water can be used, for what beneficial use, and by whom. Claimed water rights are water right claims for use recognized by the Arizona Department of Water Resources pending adjudication by the court that will decree how much water can be used, for what beneficial use, and by whom

Water quality categories –

- **Category 5 (Impaired)** – Those waters on the State of Arizona impaired waters list (the 303d List) which are characterized by the most severe water quality problems. These waters are then scheduled for total maximum daily load (TMDL) assessments. There are strict discharge permit requirements to assure that any new discharges or modifications will not further degrade water quality.

- **Category 4 (Not Attaining)** – Those waters where designated use is not attaining State water quality standards, there have been past water quality impairments, and there are current TMDL plans aimed at improving water quality.
- **Category 3 (Inconclusive)** – Those waters where all designated uses are inconclusive. Also, any surface water not assessed due to lack of credible data may be included.
- **Category 2 (Attaining Some Uses)** – Those waters where at least one designated use has been assessed as attaining and all other uses have been assessed as inconclusive.
- **Category 1 (Attaining All Uses)** – All designated uses assessed as attaining.

Well distributed – Commonplace, common, or not uncommon. Noticeable, visible, evident or conspicuous.

Wildfire - Any unplanned ignition of vegetative fuels which can be human caused, naturally caused (e.g., lightning), or caused by prescribed fires that are declared wildfires. Every wildfire contains protection objectives that address firefighter and public safety and the protection of values (e.g., natural, cultural, infrastructure). When the land management plan allows, naturally ignited wildfires may include additional resource objectives that help move ecosystems toward desired conditions.

Wilderness area – An area of undeveloped Federal land that Congress designated as wilderness and that retains its primeval character and influence, without permanent improvements or human habitation, and is protected and managed to present its natural conditions. An area that (1) generally appears to have been affected primarily by the forces of nature, with the imprint of people's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) comprises at least 5,000 acres of land or is of sufficient size to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value (Wilderness Act of 1964, P.L. 88-577).

Wild and scenic river (WSR) – A river that is free flowing and has at least one outstandingly remarkable value. Eligible and suitable rivers are given a tentative classification of wild, scenic, or recreational. These rivers may be included in the National Wild and Scenic Rivers System.

- **Wild** – Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America.
- **Scenic** – Those rivers or sections of rivers that are free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads.
- **Recreational** – Those rivers or sections of rivers that are readily accessible by road or railroad, that may have some development along their shorelines, and that may have undergone some impoundment or diversion in the past.

Wilderness Opportunity Spectrum (WOS) – Based on the same concept and management framework of the recreation opportunity spectrum (ROS). The settings, activities, and opportunities provided for within the WOS describe the variations in degree of isolation from the sounds and influences of people and the amount of recreation visitor use. There are four WOS classes: pristine, primitive, semiprimitive, and transition.

- **Pristine** – The area is characterized as an extensive, unmodified, natural environment. Natural processes and conditions have not been measurably affected by the actions of users. The area will be managed as free as possible from the influences of human activity. Terrain and vegetation allow for extensive and challenging cross-country travel.
- **Primitive** – The area is characterized by an essentially unmodified, natural environment. Concentrations of visitors are low and evidence of human use is minimal. The area has high opportunity for isolation, solitude, exploration, risk, and challenge.
- **Semiprimitive** – The area is characterized by a predominantly unmodified environment of at least moderate size. System trails and campsites are present and there is evidence of other uses. A minimum of onsite controls and restrictions are implemented to protect physical, biological, and social resources. Some facilities may be present to reduce visitor impact.
- **Transition** – The area is characterized by a predominantly unmodified environment; however, the concentrations of visitors may be moderate to high at various times. The area is characterized as having a large number of day users who are often mixed with overnight and long-distance travelers on trails near trailheads and wilderness boundaries.

Wildland-urban interface (WUI) – Includes those areas of resident populations at imminent risk from wildfire and human developments having special significance. These areas may include critical communications sites, municipal watersheds, high voltage transmission lines, observatories, church camps, scout camps, research facilities, and other structures that if destroyed by fire, would result in hardship to communities. These areas encompass not only the sites themselves but also the continuous slopes and fuels that lead directly to the sites, regardless of the distance involved.

Wildlife corridors – Strips of trees, shrubs, and understory vegetation that provide cover and habitat for wildlife and serve as travel lanes for movement across open areas and between isolated patches of habitat. They provide wildlife with access to the different types of habitat they require and can foster recolonization of forest fragments.

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Appendix A. Maps

Maps identifying potential natural vegetation types (PNVT) are provided at a coarse scale. Given the variability of the landscape, in instances where the mapped PNVT does not correspond to the vegetation type of a given area, management activities are to be governed by the plan components from the PNVT description that most accurately depicts the on-the-ground vegetation type.

Maps displaying the Recreation Opportunity Spectrum (ROS) and Scenic Integrity Objectives (SIO) are provided at the landscape scale. These boundaries are to be used as a framework for management activities and may require flexibility at the ground level to address site-specific conditions and anomalies that are not exact matches with the specific ROS or SIO designation. These types of situations may require field expertise and judgment to identify an area's ROS or SIO designation and may need to be adjusted to meet site-specific conditions.

For printing: Maps 1 to 4 are formatted to be printed on paper sized at 11 x 17 inches. For printers limited to sheets sized at 8½ x 11 inches, the appropriate settings (e.g., "Fit to Page") will need to be adjusted to ensure that these maps are plotted successfully to your printer.

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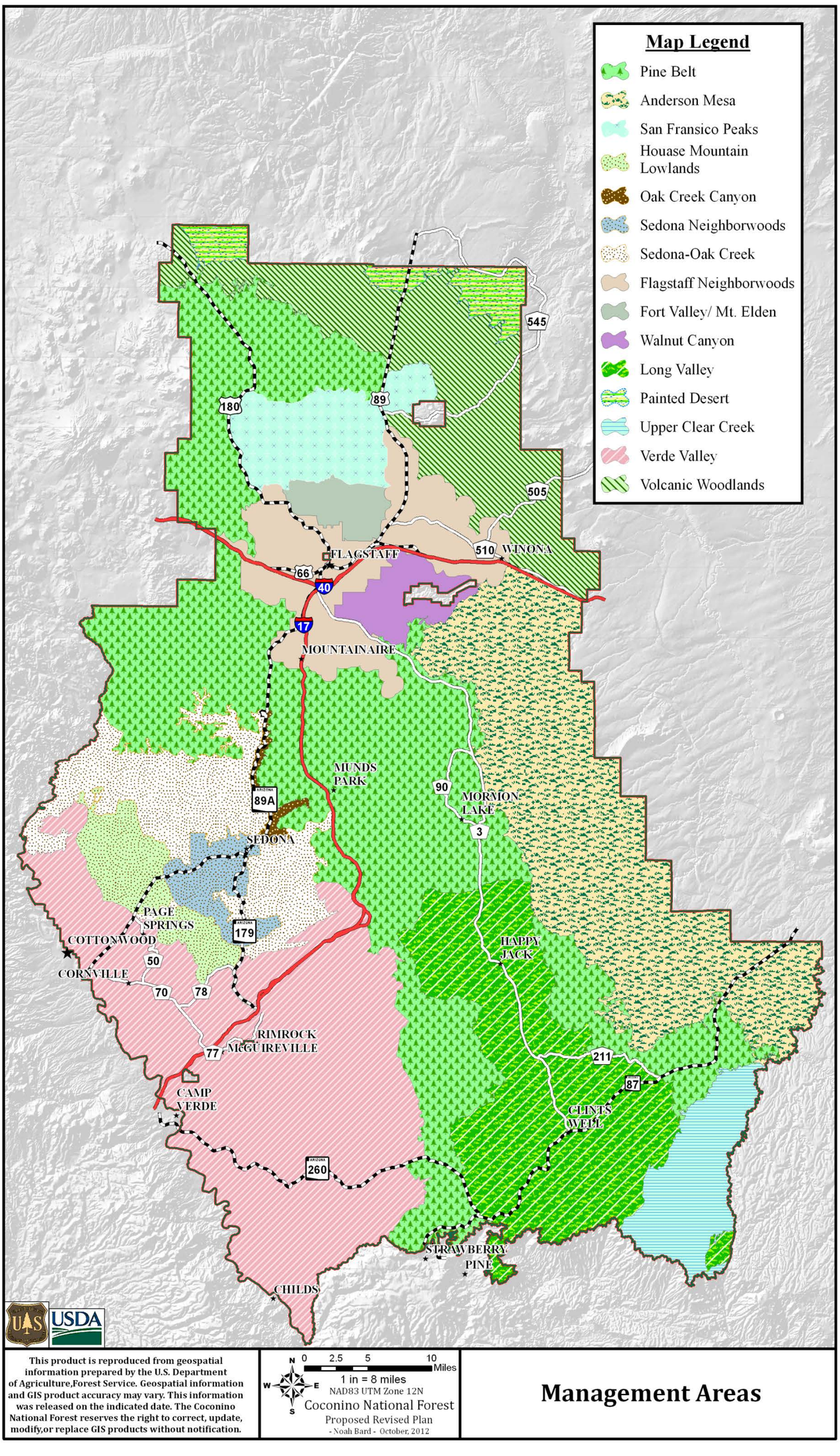
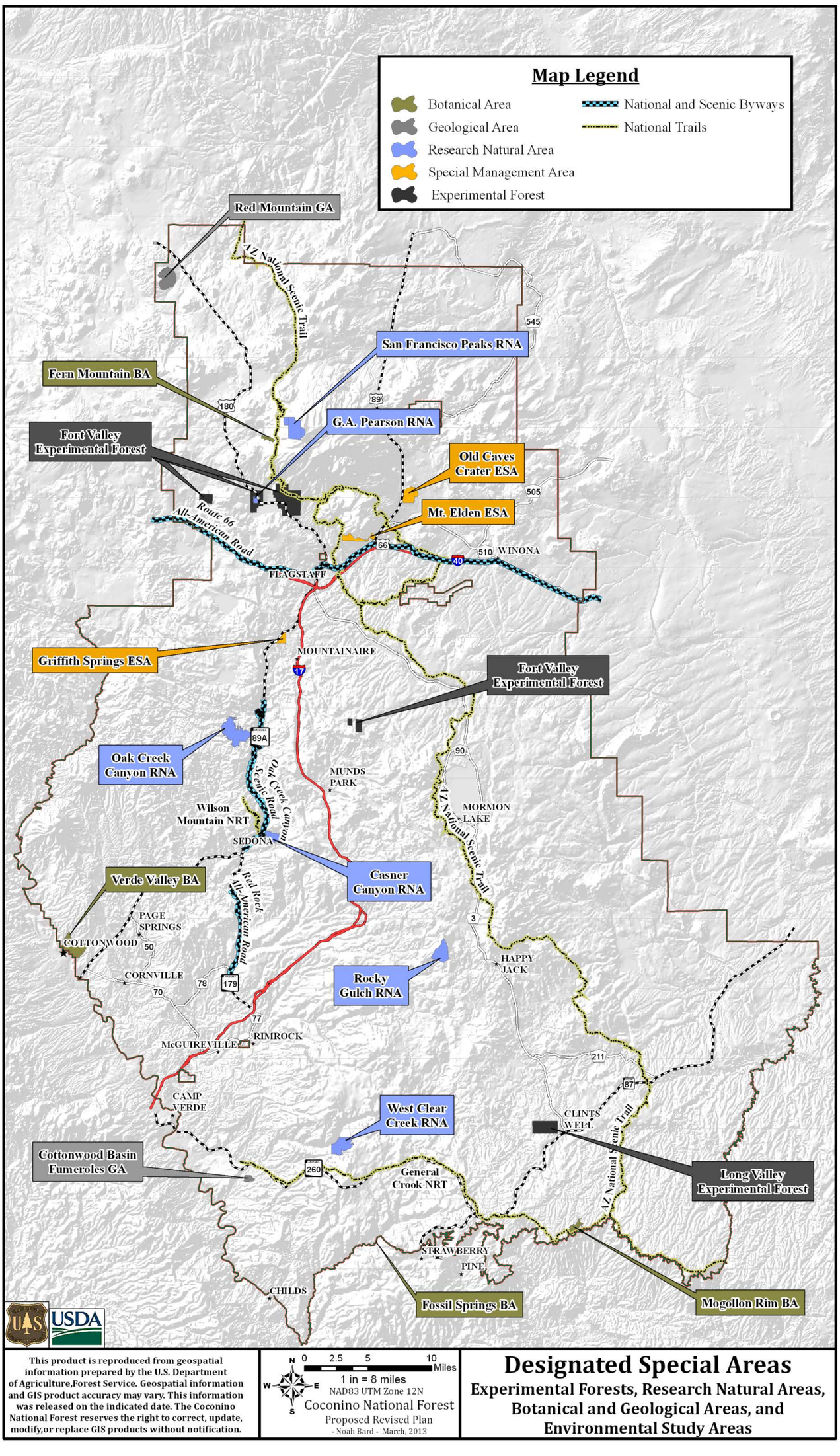
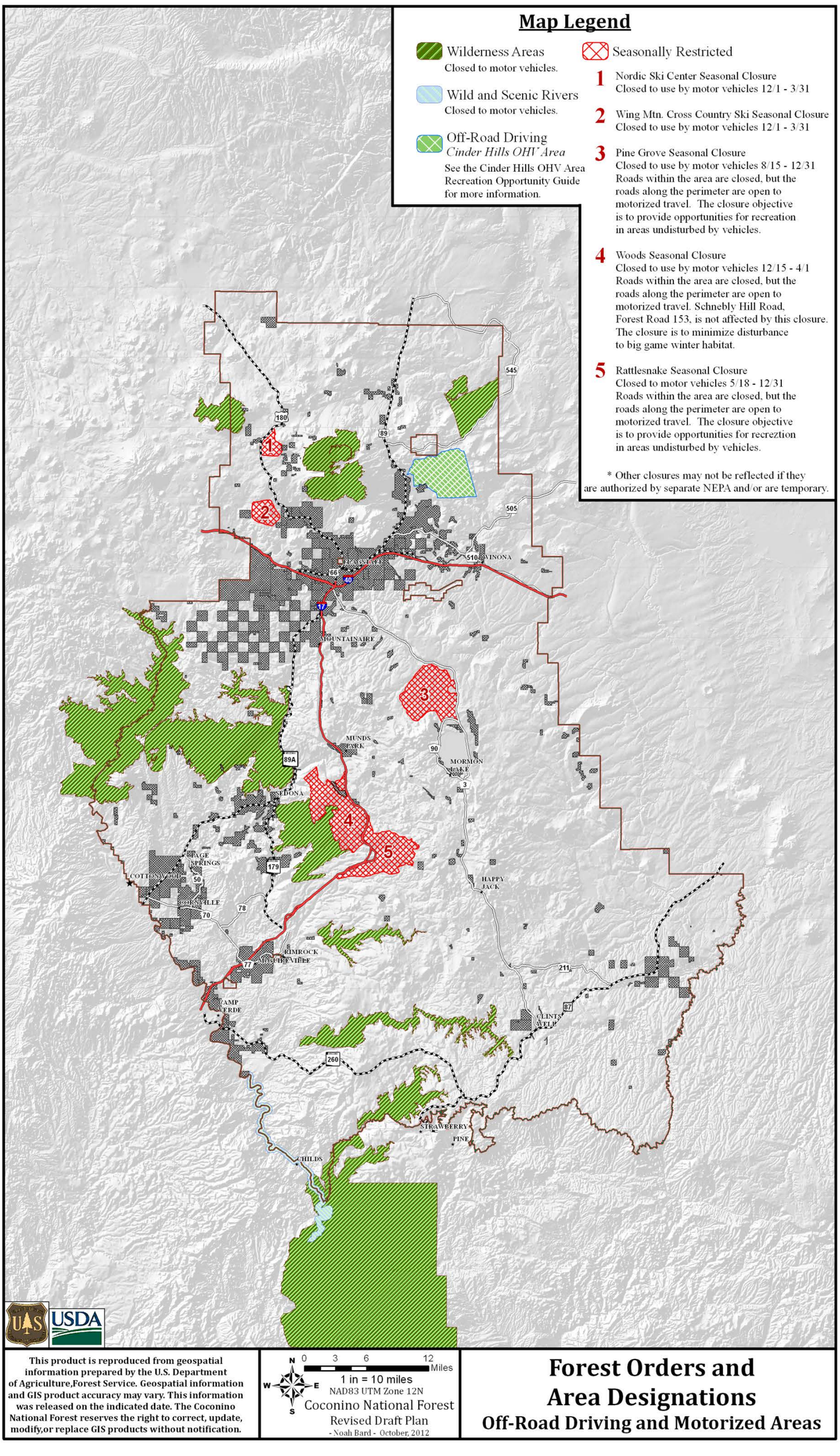
Map 1. Management areas

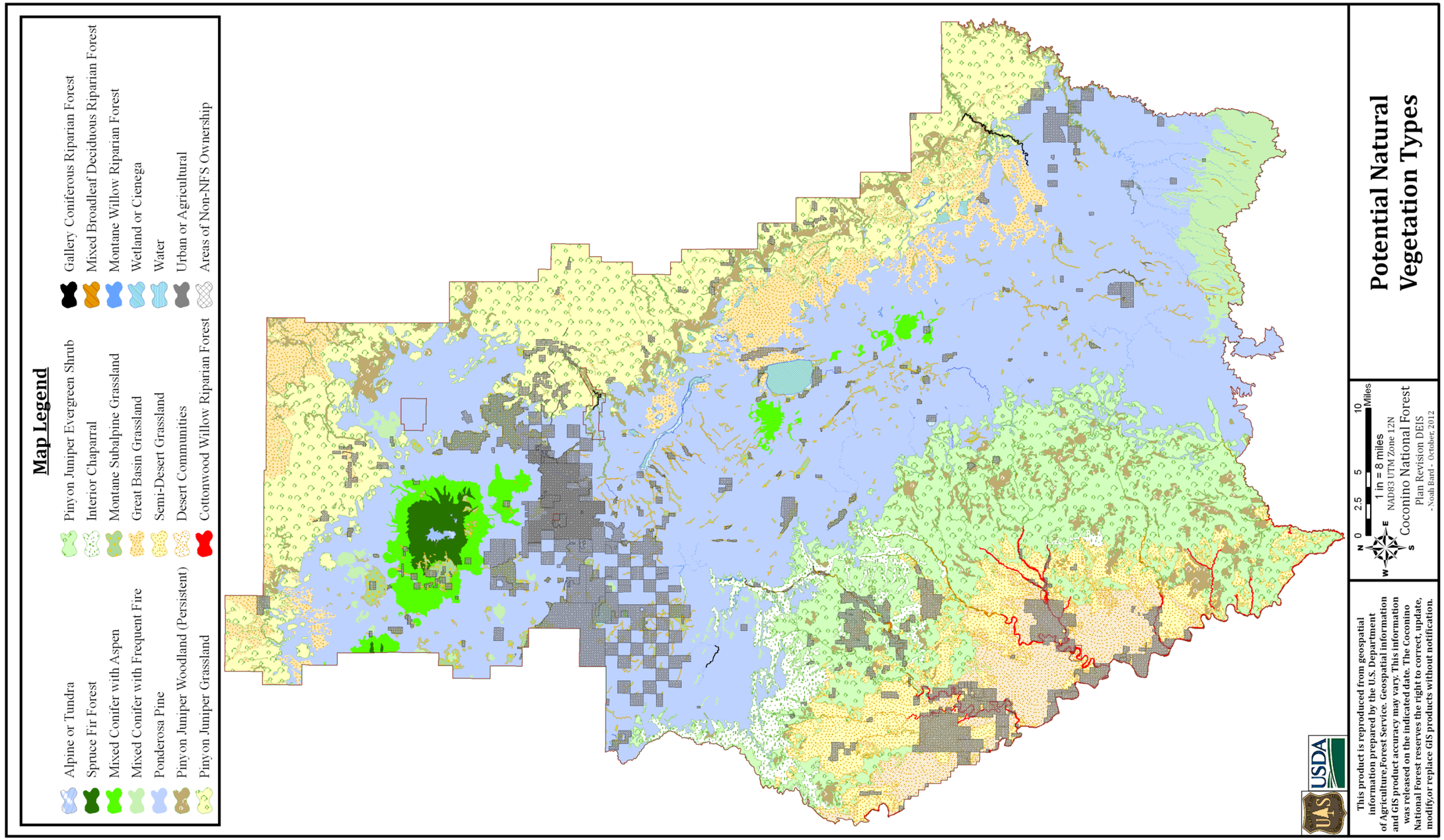


Map 2. Designated special areas

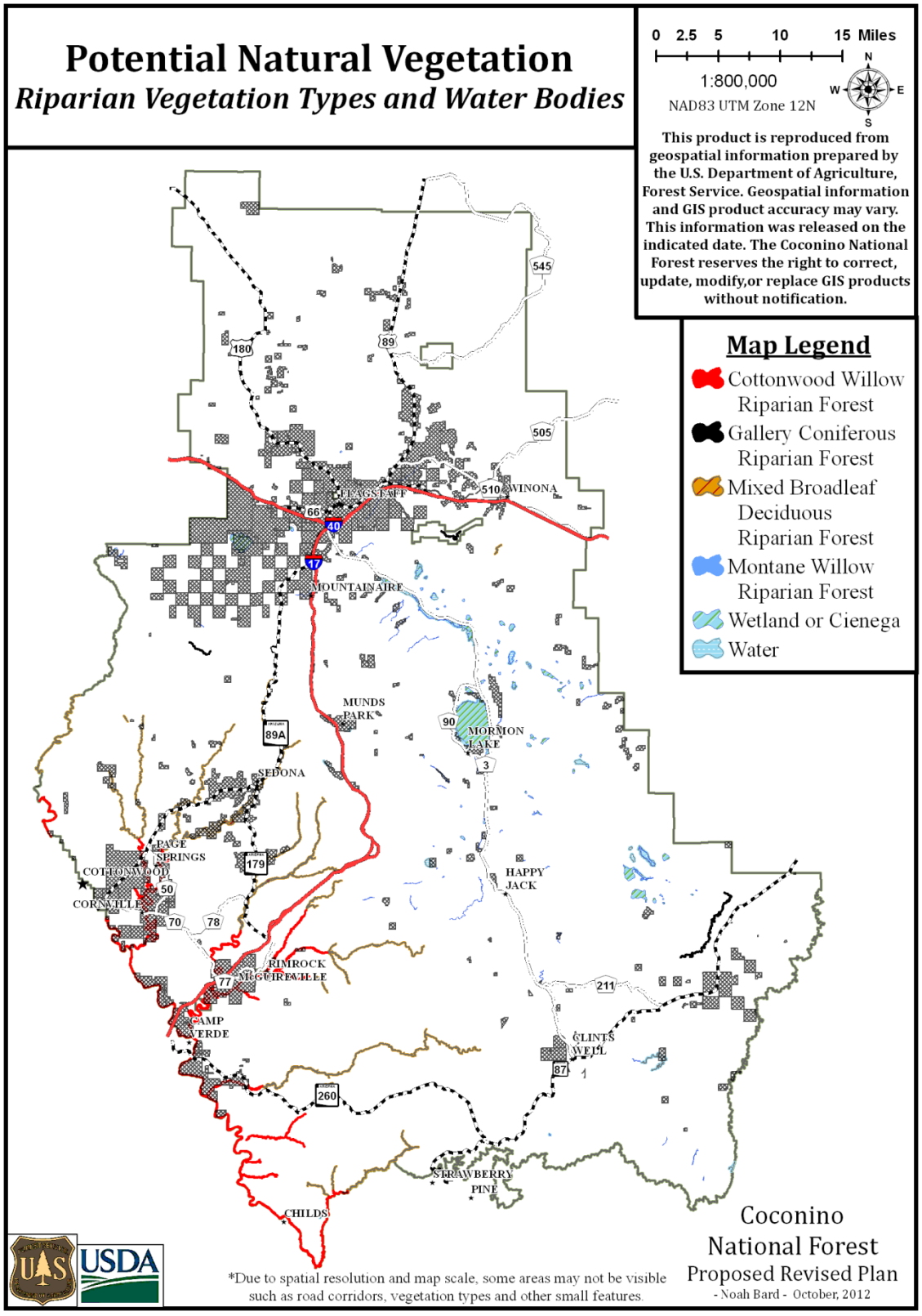


Map 3. Forest orders and area designations

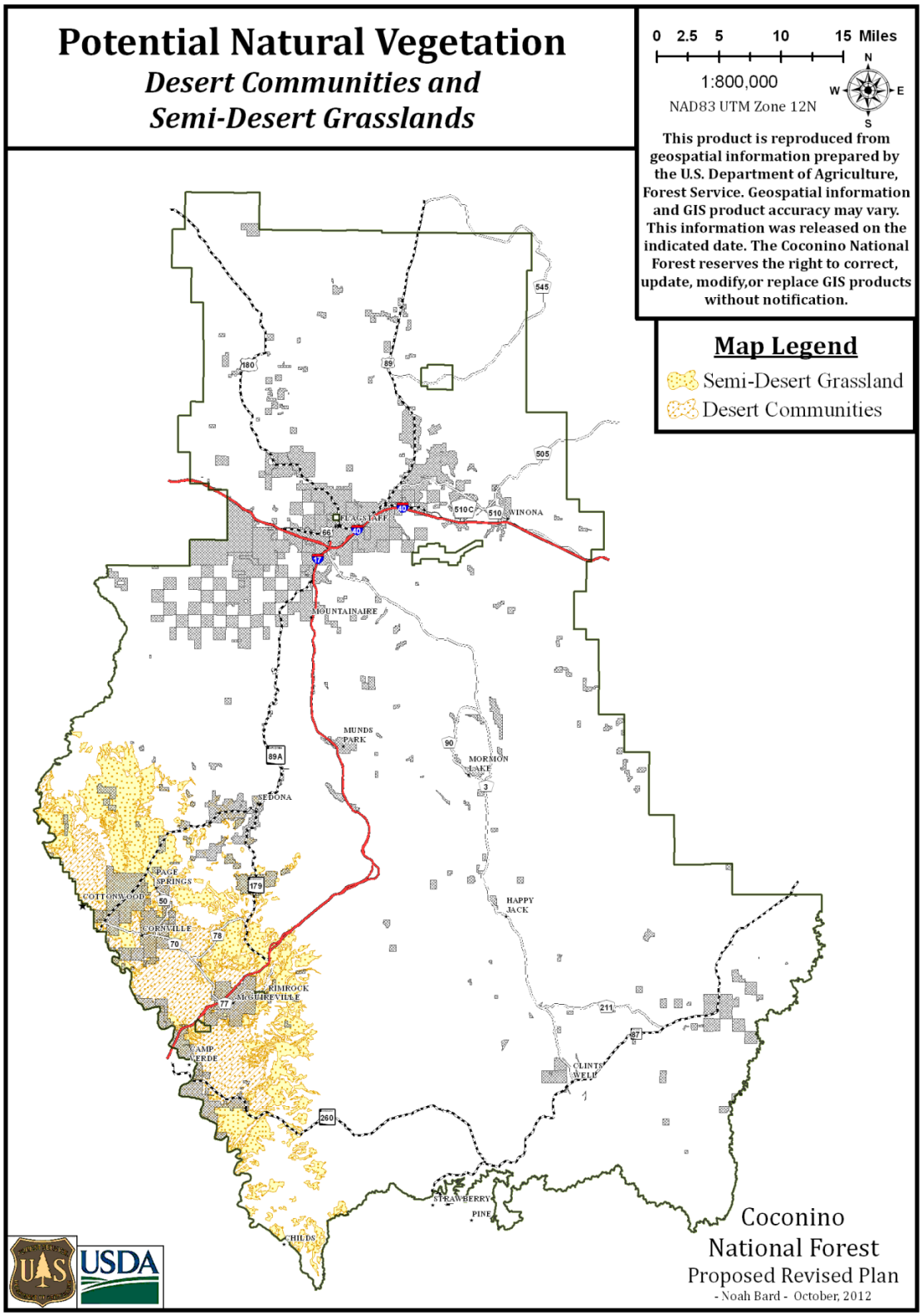




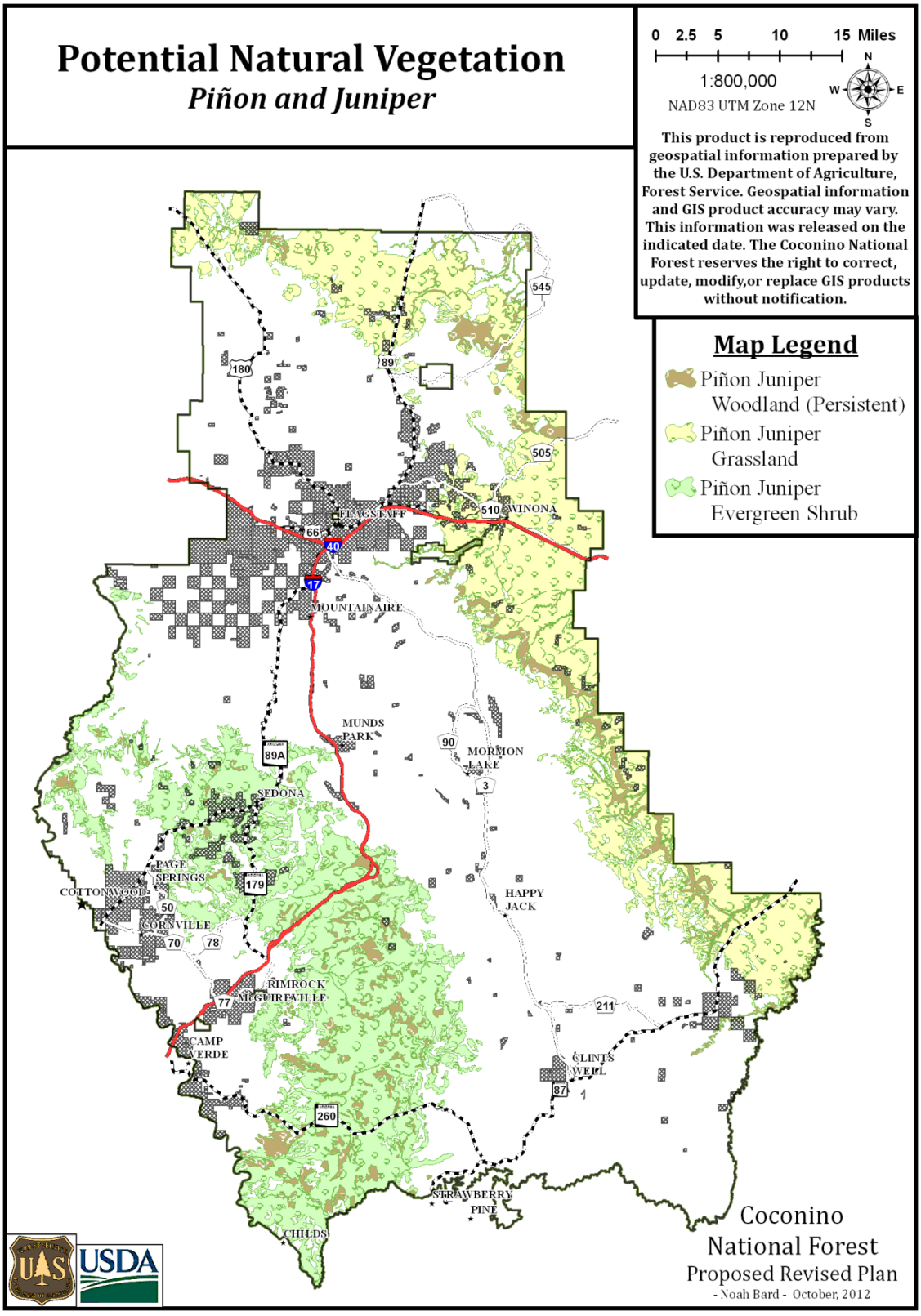
Map 4. Potential Natural Vegetation Types



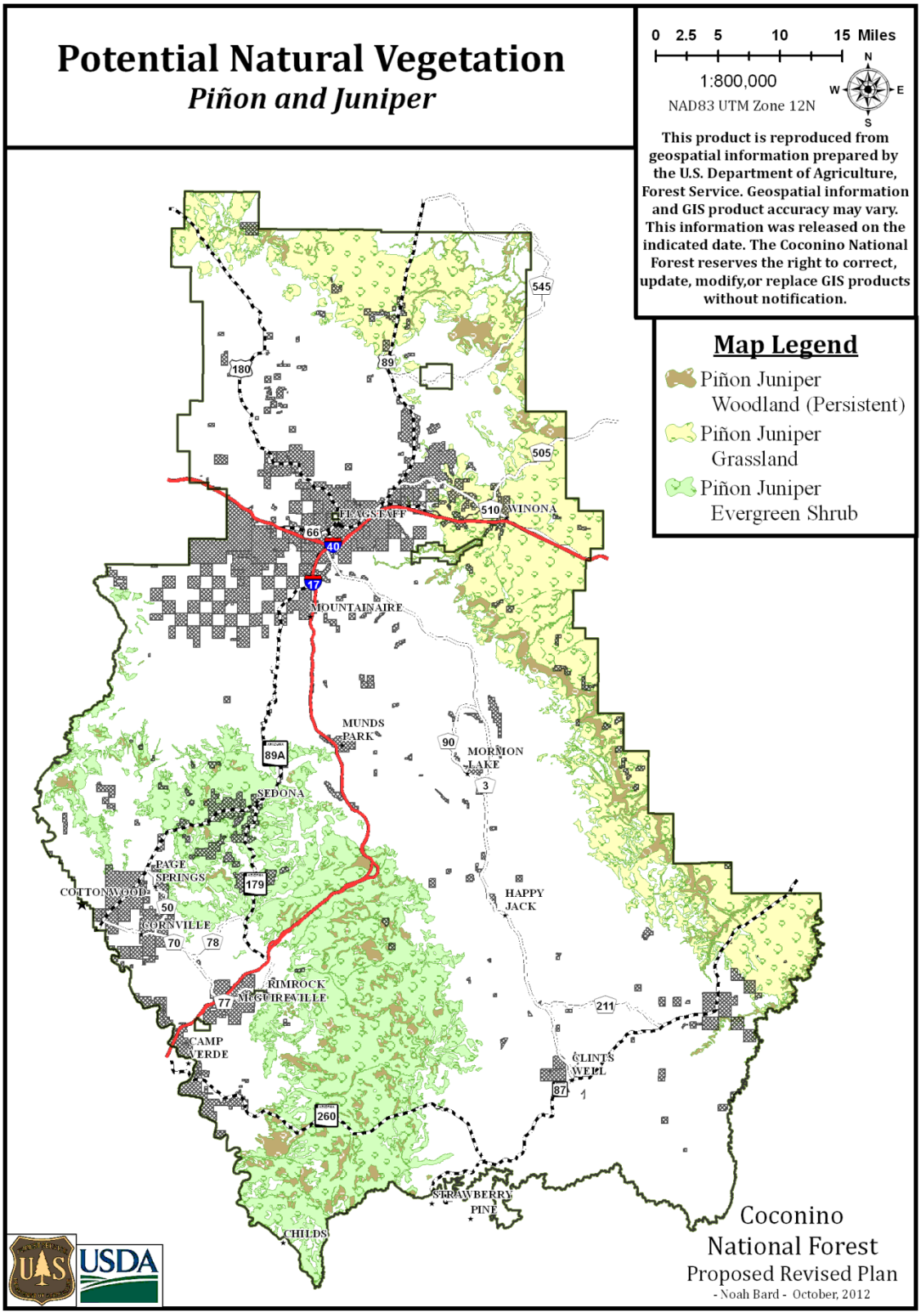
Map 5. Potential Natural Vegetation Type – Riparian Vegetation and Water Bodies



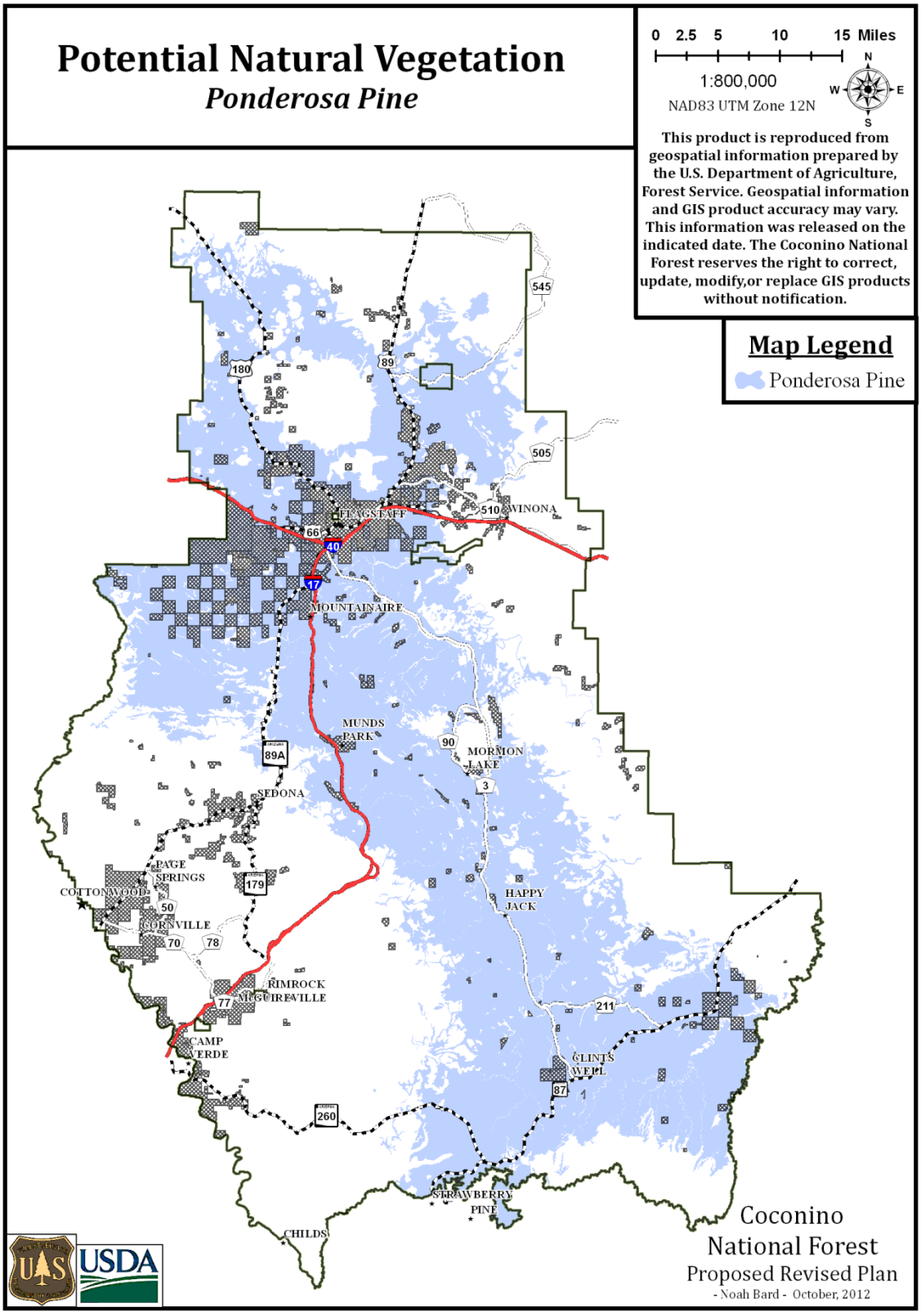
Map 6. Potential Natural Vegetation– Desert Communities and Semidesert Grasslands



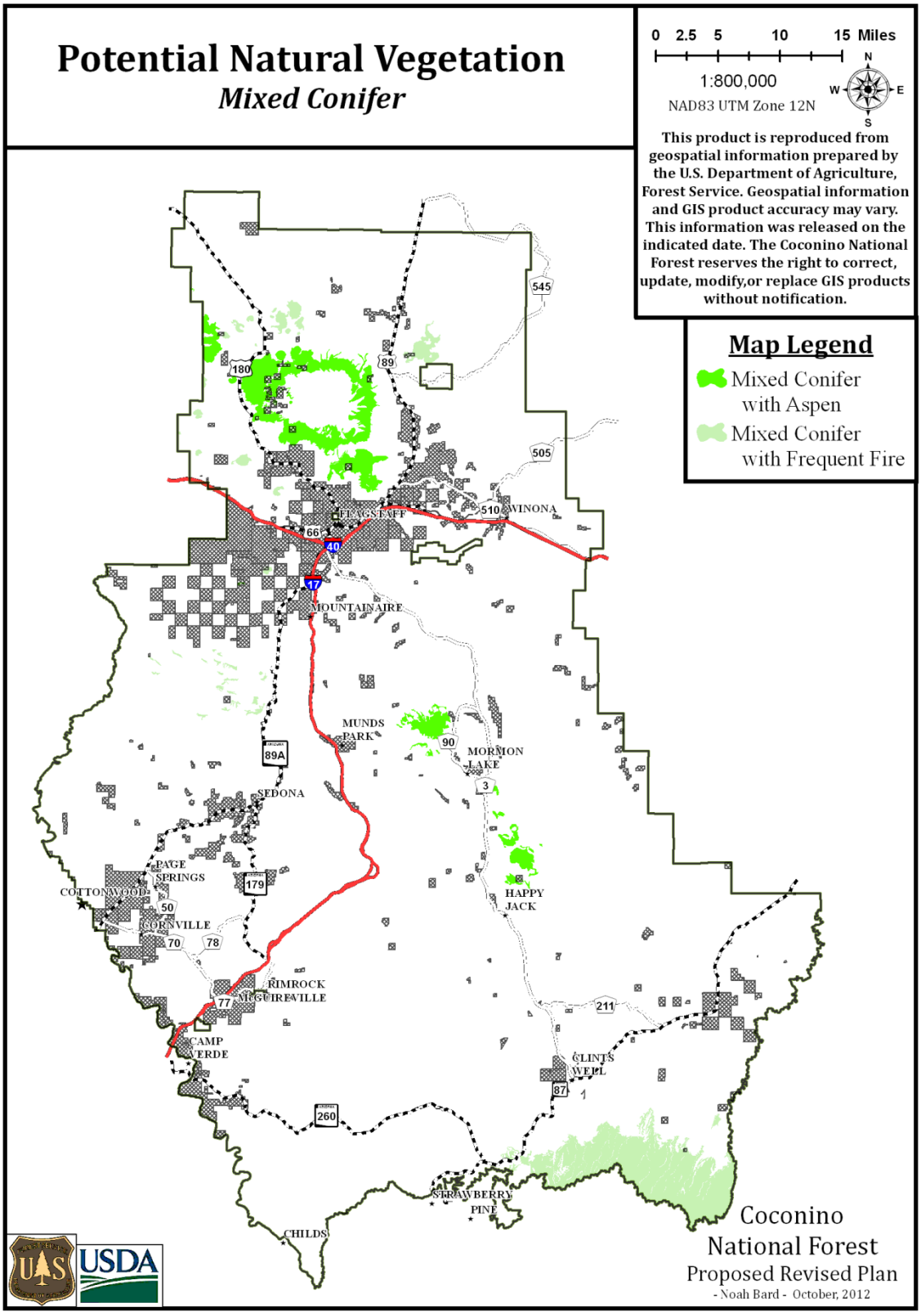
Map 7. Potential Natural Vegetation – Interior Chaparral



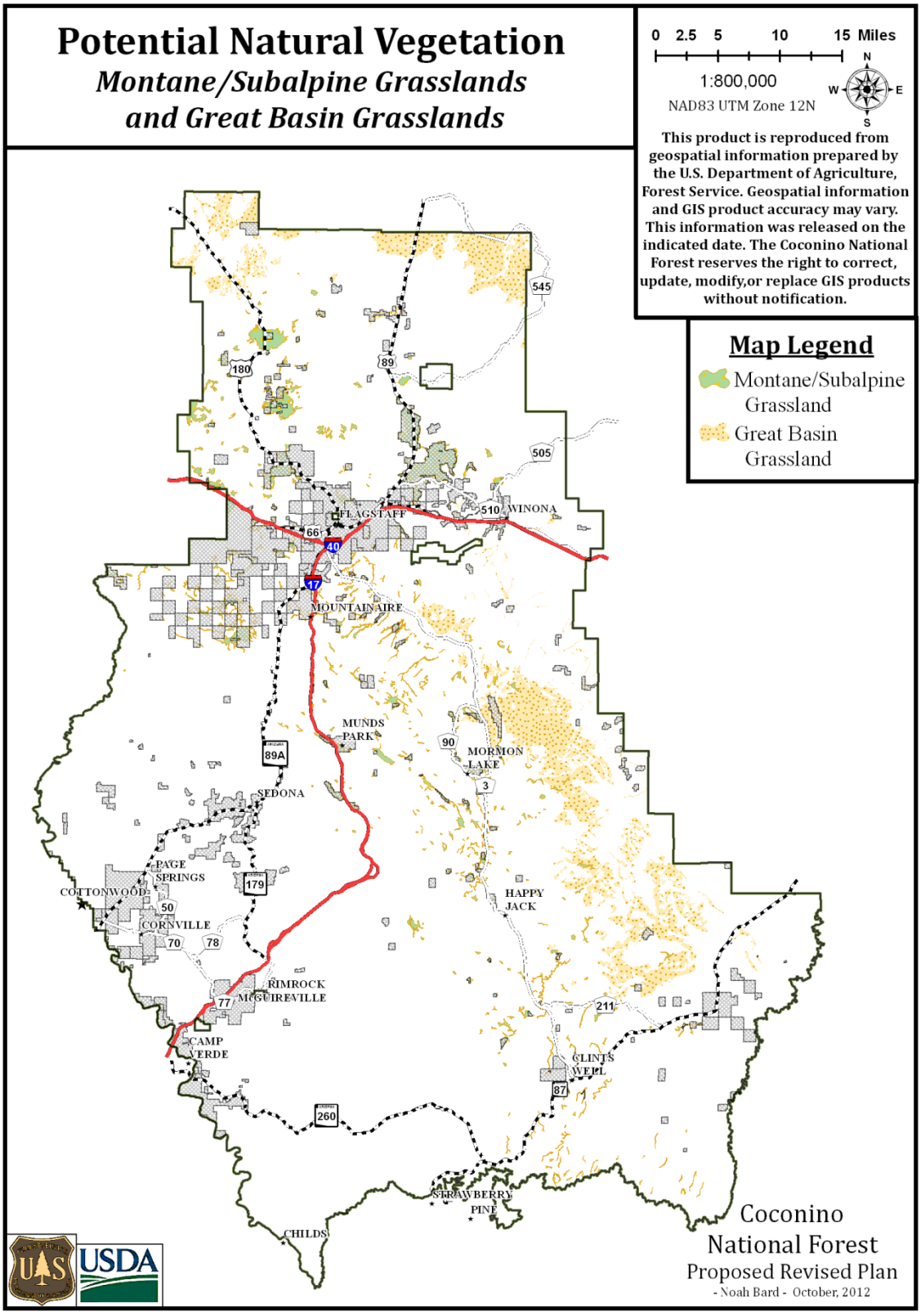
Map 8. Potential Natural Vegetation – Piñon and Juniper



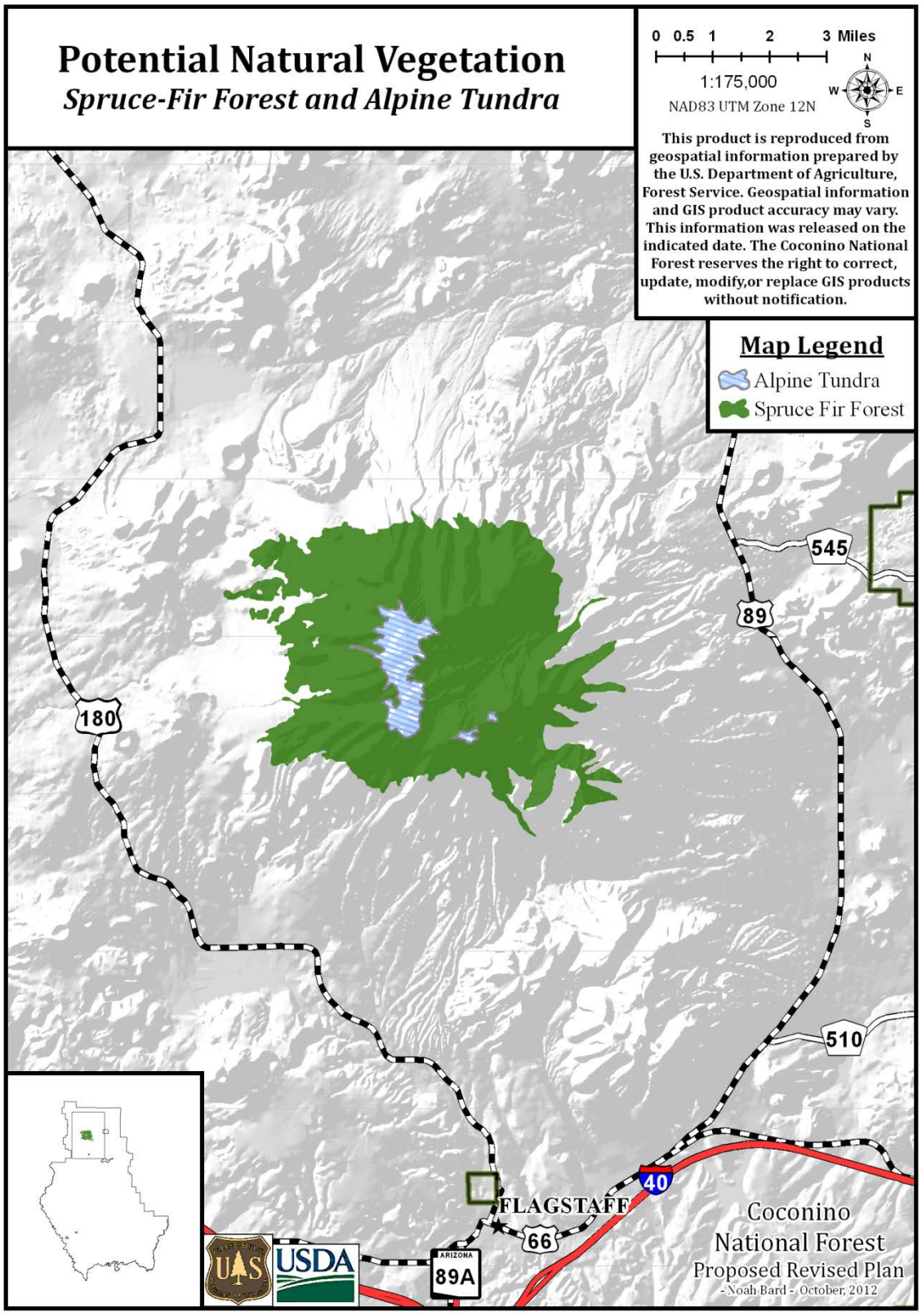
Map 9. Potential Natural Vegetation – Ponderosa Pine



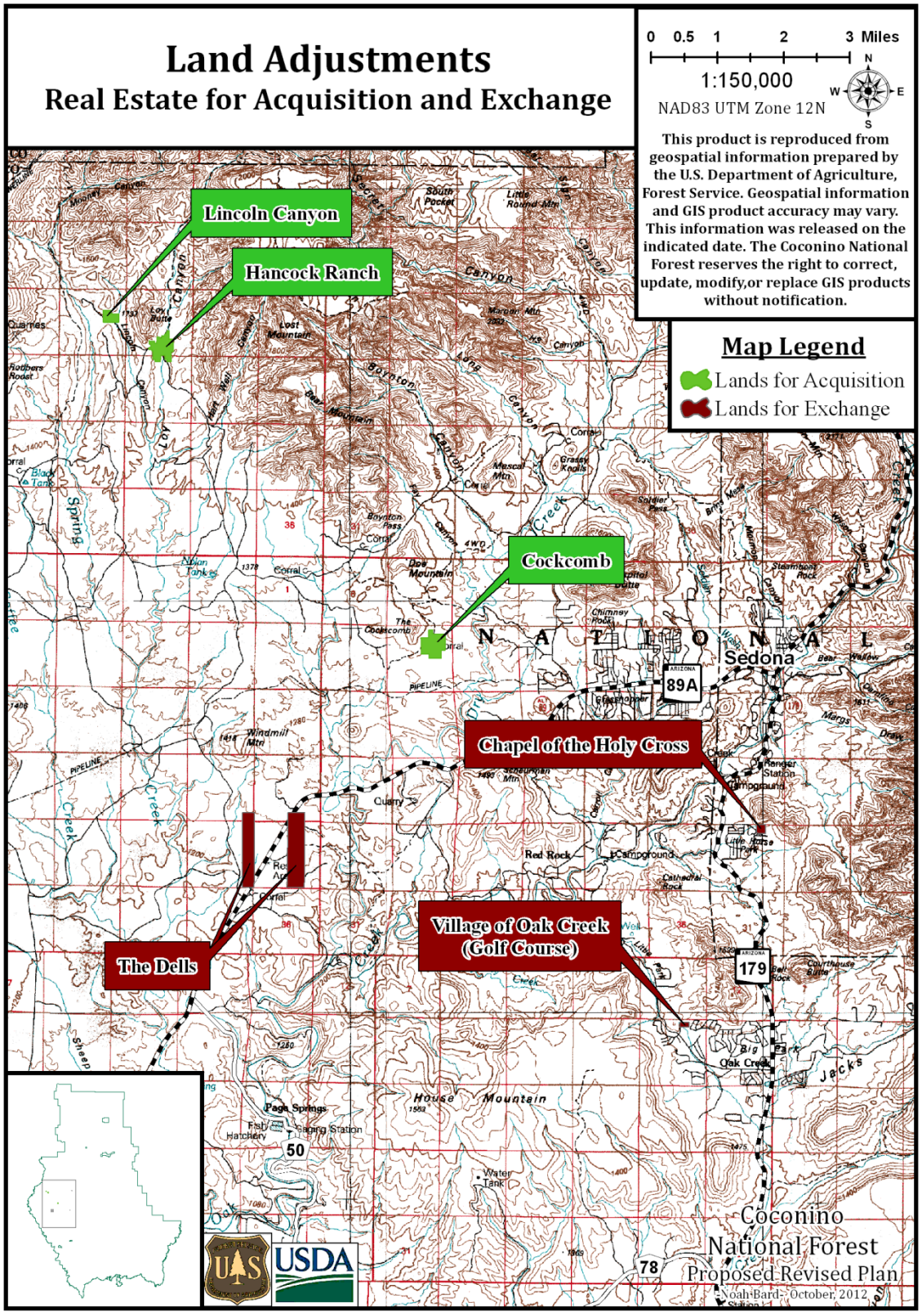
Map 10. Potential Natural Vegetation – Mixed Conifer



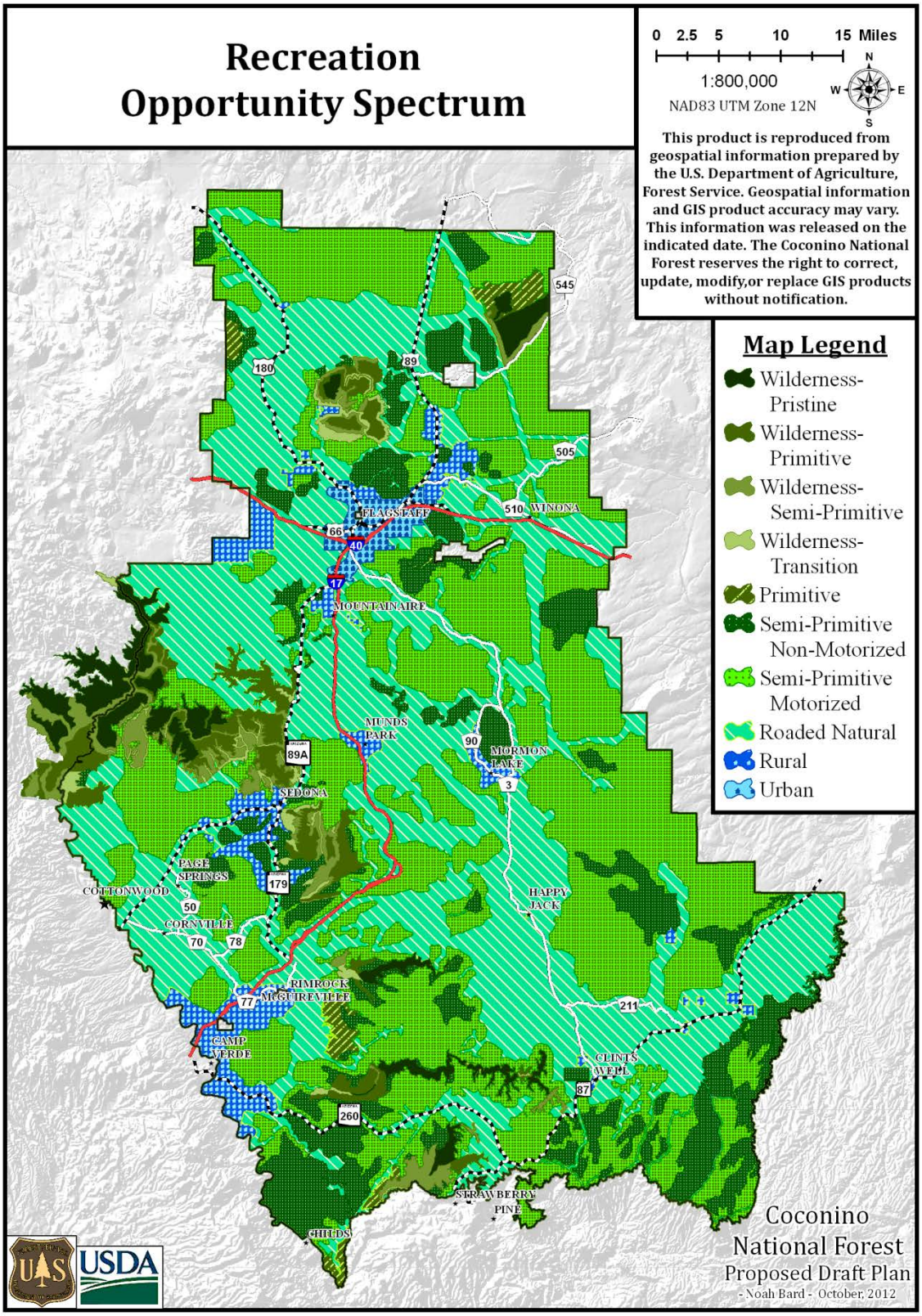
Map 11. Potential Natural Vegetation – Montane/Subalpine and Great Basin Grasslands



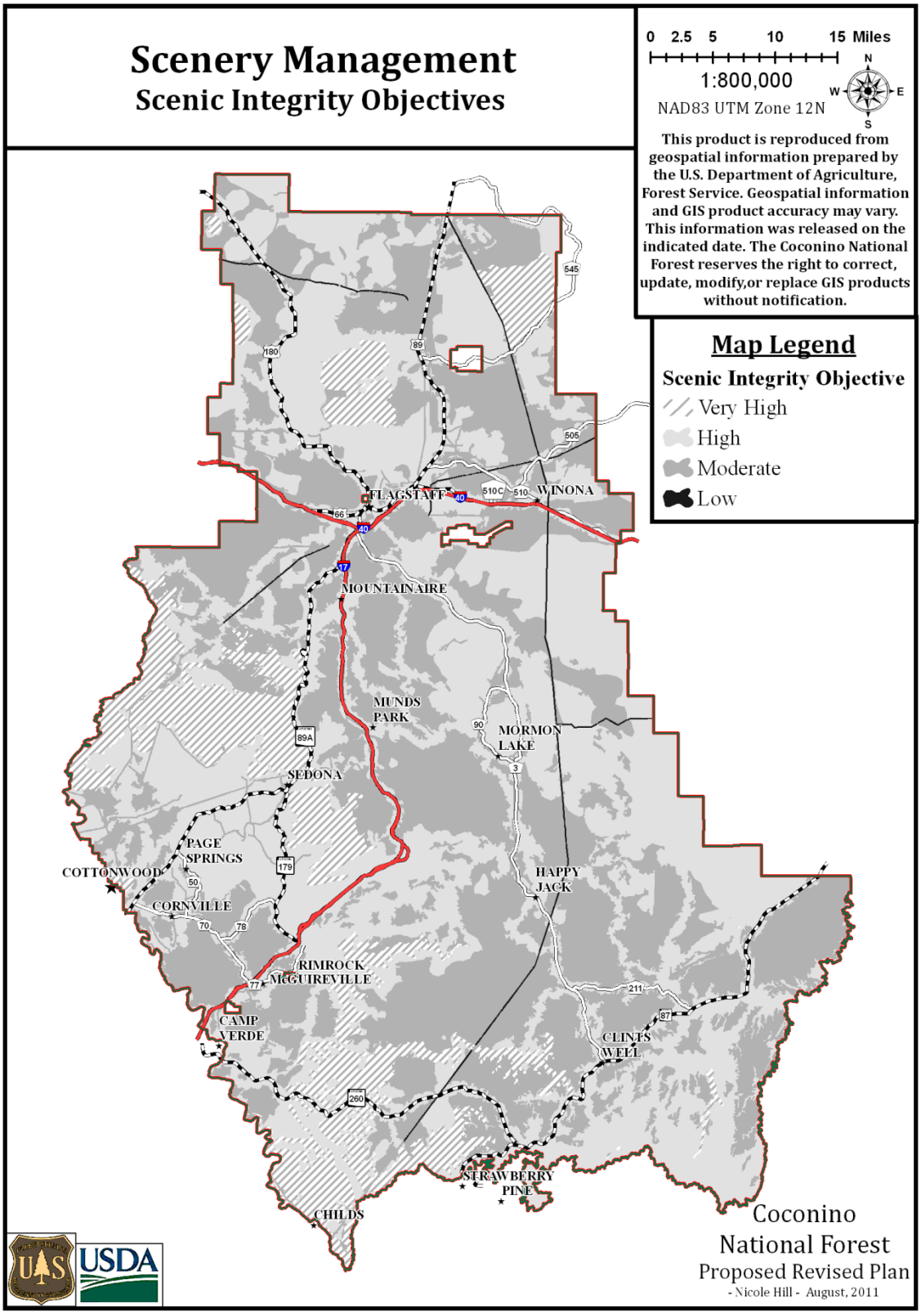
Map 12. Potential Natural Vegetation – Spruce-Fir Forest and Alpine Tundra



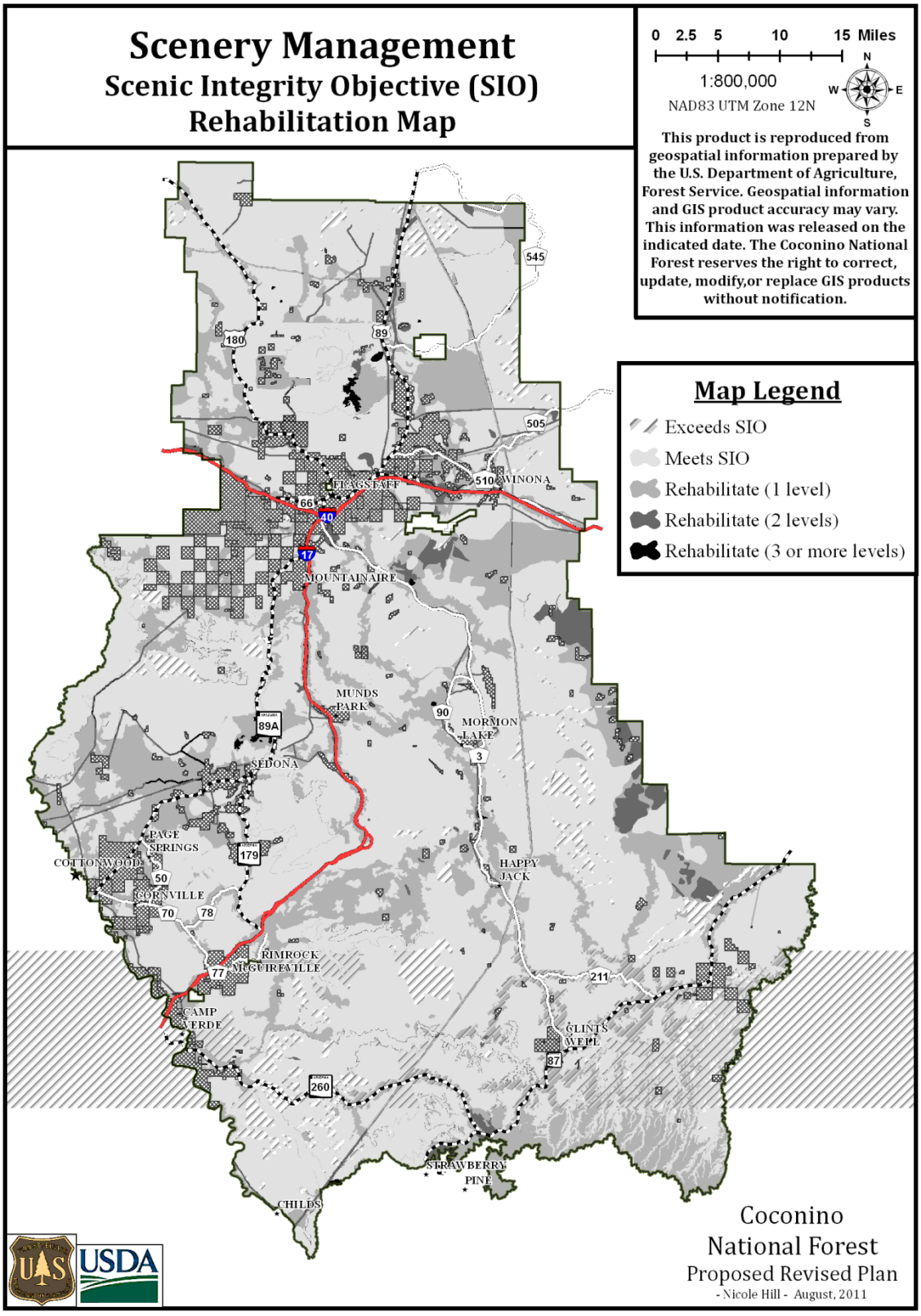
Map 13. Land adjustments – real estate for acquisition and exchange



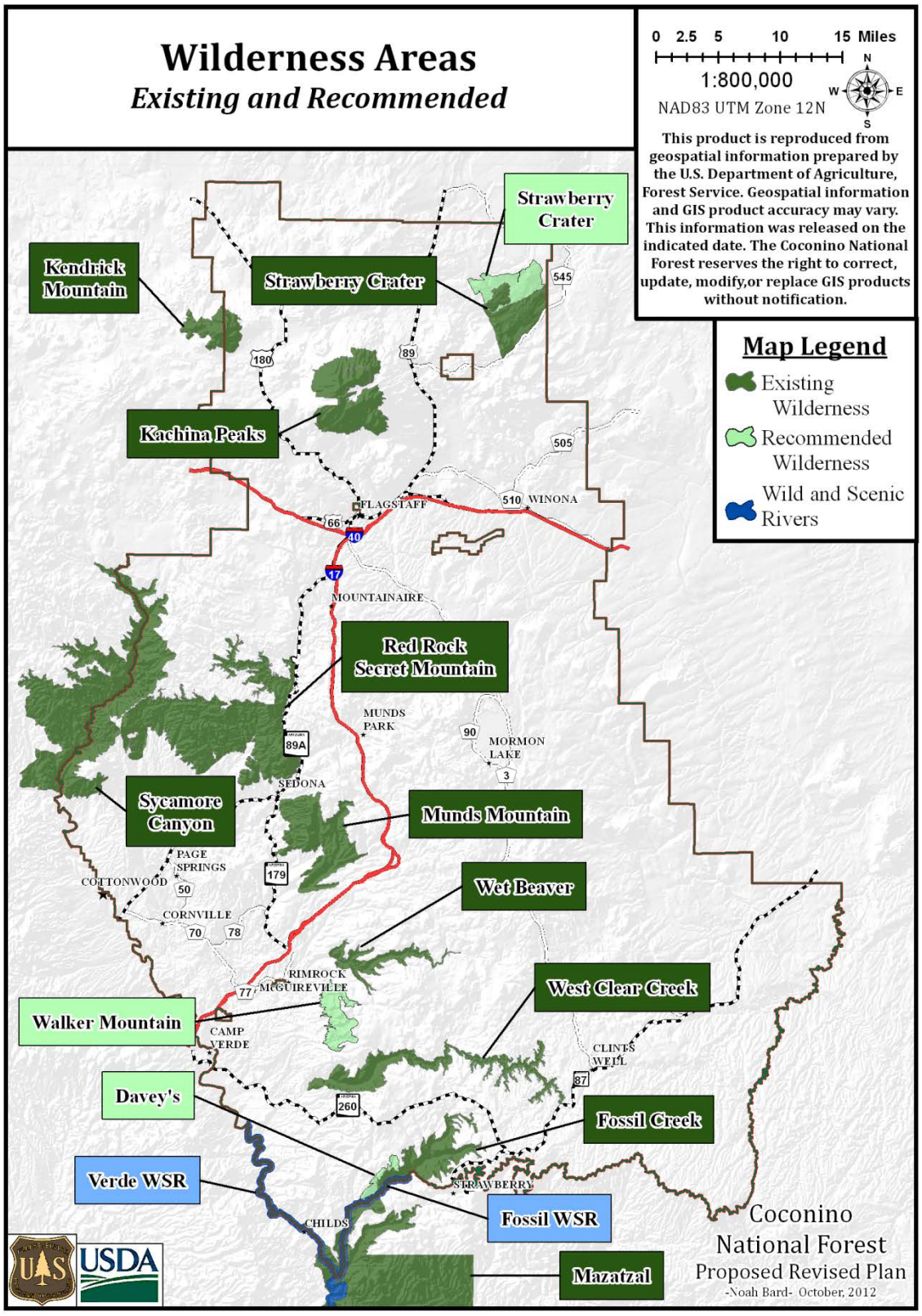
Map 14. Desired recreation opportunity spectrum (ROS)



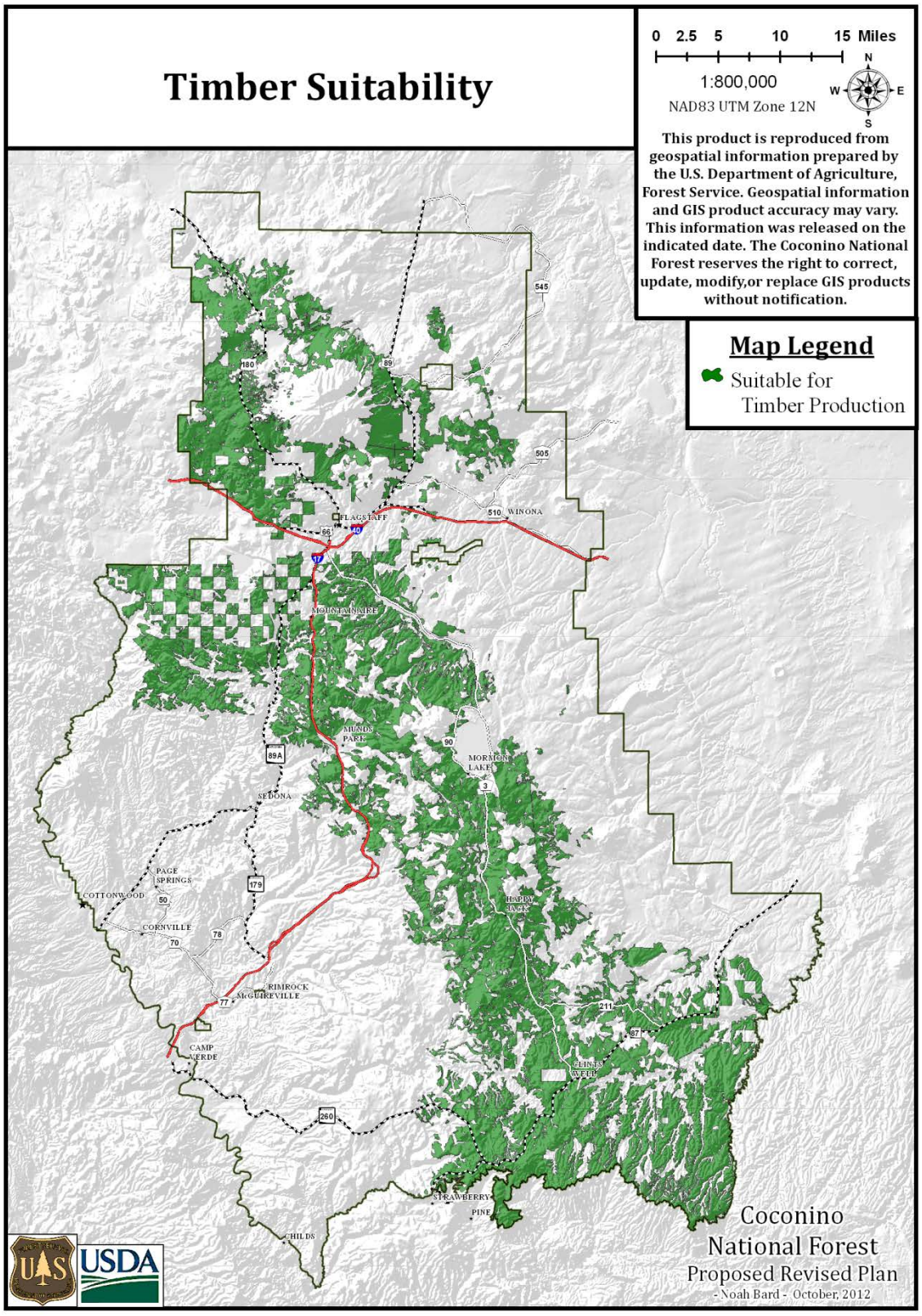
Map 15. Scenery management – scenic integrity objectives (SIOs)



Map 16. Scenery management – scenic integrity objectives rehabilitation



Map 17. Existing and recommended wilderness areas



Map 18. Timber suitability

Appendix B. Proposed and Probable Management Practices

Introduction

This appendix describes proposed and probable practices and timber sale schedule that may subsequently take place on the Coconino NF at the project or activity level to help maintain existing conditions or achieve the desired conditions described in the plan. Included are items such as program strategies; inventories, assessments, resource analyses and other planning needs; and ongoing work with partners and cooperating agencies anticipated during the next 10 to 15 years.

The listed proposed and probable management practices are not intended to be all-inclusive, nor are they intended to be decisions. They are simply projections of what actions may take place in the future. A plan amendment is not required to change or modify any of the proposed and possible actions. The list of these actions can be updated at any time through an administrative correction of the plan. More information may be found under plan objectives and management approaches.

Ecosystems

Air

- Coordinate with the Arizona Department of Environmental Quality (ADEQ) on smoke impacts from wildfires and prescribed fires.

Watersheds, Water Quality and Quantity

- Plan and implement improvement activities in watersheds which are functionally at risk or impaired.
- Secure water rights and participation in water right settlement and adjudication.
- Coordinate and educate with other government agencies to protect water quality and protect aquatic ecosystems from invasive plants and animals.

Wetlands and Reservoirs/Lakes

- Restore wetlands that are not in proper functioning condition.
- Coordinate with the Arizona Game and Fish Department (AZGFD) and U.S. Fish and Wildlife Service (USFWS) on the management of sport and native fishes.

Springs

- Reconstruct or restore riparian function to at least 25 springs identified as not in proper functioning condition

Biophysical Features

- Coordinate with State and Federal agencies to manage and monitor bat roosts in order to determine population dynamics at least once every 3 years.

- Monitor significant caves or other biophysical features to determine visitor impacts and the conditions of key resources in order to protect the long-term ecology of the feature or resource.
- Participate in public education activities about disease prevention "best practices" for caves.
- Complete periodic updates to the list of significant caves on the forest.

Paleontological Resources

- Coordinate and collaborate, where possible, with the scientific community, non-Federal partners, and the general public.
- Promote educational programs, interpretive presentations, or publications to increase public awareness of forest paleontological resources and their significance.
- Complete paleontological surveys in areas where there is high potential to encounter these resources.

Soil

- Maintain satisfactory soil conditions and improvement of impaired and unsatisfactory soil conditions. Treatments which move forest priority 6th code watersheds toward satisfactory conditions should take precedence.
- Implement resource improvement projects that are beneficial for maintaining and improving (1) soil condition and productivity and (2) water quality and quantity.
- Complete onsite soil investigations and refinement of maps for soil disturbing projects that require site-specific, precise, and highly detailed soil information which is beyond the scale of the terrestrial ecosystem survey.
- Analyze or collect site-specific TES information, as needed, to accurately determine the limitations, suitabilities, and productivity potentials of the different terrestrial ecosystems that occur on the forest.

Wildlife, Fish, and Botany

- Implement actions to benefit federally listed and sensitive species by contributing to its recovery or supporting trends that avoid listing.
- Restore terrestrial and aquatic wildlife habitat.
- Coordinate with the AZGFD, USFWS, and interested parties on education, research, and activities that promote and enhance habitat conditions and species recovery.
- Maintain the native-fish-only status of Fossil Creek through remedial actions to remove invasives, increase public education, and provide signage and law enforcement.

All Vegetation Types

- Restore maple and aspen stands.
- Coordinate with local research institutions.

Riparian Types

- Restore nonfunctioning or functioning-at-risk riparian areas so they are in or moving toward proper functioning condition.

Desert Communities

- Construct trails and establishment of restrictions to prevent recreation impacts to Desert Communities.

Semidesert Grasslands

- Collaborate with partners and stakeholders on grassland restoration, grassland connectivity, and education.

Great Basin and Montane/Subalpine Grasslands

- Distribute information to the media and general public that is focused on the unique properties of meadows and appropriate activities within meadows.
- Collaborate with partners and stakeholders on grassland restoration, connectivity, and education.
- Coordinate with the AZGFD on objectives for wildlife conservation, education, and habitat restoration and improvements, particularly regarding pronghorn and prairie dogs.

Interior Chaparral

- Coordinate with local partners and stakeholders to reduce the risk of uncharacteristic fire in the wildland-urban interface (WUI) on the Coconino NF and adjacent non-National Forest System lands.

Piñon and Juniper

- Complete treatments in piñon-juniper vegetation types to move toward desired conditions.
- Use naturally ignited fires to treat Piñon-Juniper Evergreen Shrub and Piñon-Juniper with Grass with low to mixed severity fire.

Ponderosa Pine

- Thin and use prescribed fires and naturally-ignited fires to treat ponderosa pine.

Mixed Conifer Types

- Use prescribed fires and naturally-ignited fires to treat mixed conifer types.

Spruce-Fir and Alpine Tundra

See “Wilderness.”

Invasive Species Management

- Complete treatments in areas containing invasive species to restore native vegetation.
- Complete treatments in aquatic systems containing invasive species to restore native fish populations.
- Prioritize wilderness areas, research natural areas, botanical areas, wild and scenic areas, and riparian areas for control of invasive exotic species to maintain the integrity of native species populations in these unique and rare habitats.
- Maintain a current inventory of invasive exotic species on forest lands.
- Coordinate invasives species management activities with internal and external partners and stakeholders to reduce, minimize, or eliminate the potential for the introduction, establishment, spread, and impact of invasive species.

People and the Landscape

Fire Management

- Complete treatments in WUI areas to reduce fire hazards to communities and the forest.
- Coordinate with other jurisdictions such as communities; service providers (infrastructure); and county, Federal, State, tribal, and local entities regarding prevention, preparedness, planned activities, and responses to wildland fires. Provide notification of upcoming and ongoing fire season activities and any prescribed fire activities to these jurisdictions.
- Implement initial attack activities and other activities to manage naturally-ignited wildfires for resource objectives.
- Participate in the development and implementation of community wildfire protection plans (CWPP) to promote public safety and to reduce the risk of wildfire on non-National Forest System lands.

Livestock Grazing

- Review active allotment management plans on a regular basis.
- Maintain and replace fencing, waters, and other range improvements.

Forest Products

- Ensure the sustainability of special forest products through observation of commercial sales and personal use permit harvest levels.

Energy and Minerals

- Coordinate with the Bureau of Land Management (BLM) to properly process applications for mineral entry on the forest.
- Request withdrawal of some areas on the forest from mineral entry.
- Rehabilitate mineral operations sites that are no longer in use.

Heritage Resources

- Complete project clearances required under existing law, regulation, and policy.
- Complete class of property analysis to better understand site classes and provide more cost-effective clearances.
- Complete nonproject related archaeological surveys in area of moderate or very high site density.
- Stabilize historic structures.
- Participate in partnerships with the Arizona Site Stewards Program, the Arizona Archaeological Society, National Park Service, and the Museum of Northern Arizona to study, protect, and monitor sites.
- Protect cultural and biological resources in the vicinity of Hartwell Canyon.
- Curate records and artifacts through agreements with Forest Service approved repositories.
- Support offsite educational/enrichment products such as classroom programs, heritage celebrations, publications, and field trips.
- Update the cultural resources overview as archaeological study units are defined and existing class of property classes are analyzed.

Tribal Relations and Uses

- Continue tribal consultation on projects and needs as they arise.
- Observe memoranda of agreement between the forest and consulting American Indian tribes to guide consultation processes and reflect the tribes' particular perspectives and interests.
- Participate in regular meetings with tribes to understand their needs.
- Develop a consistent forest productions collection policy and tribal firewood program for use on both the Coconino and Kaibab National Forests by working with the Kaibab National Forest and local tribes.
- Create volunteer opportunities for tribal members.

Roads and Facilities

- Naturalize or decommission unauthorized roads and system roads to create a more cost-effective road system and to restore natural resources impacted by roads.
- Construct and close new temporary and permanent roads to support ecosystem restoration activities.
- Coordinate with local, State, and Federal agencies to mitigate impacts from community, highway, and interstate road reconstruction and management needs.
- Implement effective wildlife passage improvement projects.
- Issue road use permits to private landowners who use forest roads and take maintenance responsibility for roads that primarily serve private uses.
- Evaluate outdated facilities and sites for current and future needs, potential reuse, and the capacity to update or retrofit them in order to meet the agency's mission in an economical manner.

Land Adjustments

- Consult with local governments about land adjustment proposals the Coconino NF plans to carry forward and conduct NEPA (National Environmental Policy Act) analysis.
- Encourage open space designations on private land (located between private development and national forest lands) as a buffer to minimize conflicts between residents and other forest users.
- Coordinate with landowners and local and regional governments to encourage private land uses that are compatible with the forest's desired conditions.
- Coordinate with local and regional governments and road agencies to develop transportation solutions that reduce traffic and vehicle impacts on National Forest System lands.
- Ensure reasonable road ingress and egress to private property in the Neighborwoods Management Area that allows fire engines mobility and access.
- Acquire right-of-way agreements for the public and Forest Service uses.

Special Uses

- Issue and supervise permits for new special use activities on the forest including: powerlines, special events, large group gatherings, outfitter-guide activities, and research.
- Rehabilitate existing special use sites that do not meet the scenery guidelines as they are brought up for reauthorization or are no longer required.
- Issue and supervise forest product or vegetation management permits to lessen abrupt vegetation transition in powerline rights-of-way, where it is necessary to clear the right-of-way boundary to meet national standards.
- Complete updates to communication site plans for existing and new communication sites.
- Coordinate with the research community to identify and manage long-term research locations, with the intent of balancing research and management needs.
- Identify preapproved sites for recreation events and large group gatherings on the Red Rock and Flagstaff Ranger Districts.
- Coordinate with the AZGFD for wildlife viewing permits.

Dispersed Recreation

- Develop trail systems for bikes, equestrians, and motorized recreation users.
- Complete updates and changes to the motor vehicle use map to achieve forest plan desired conditions.
- Maintain trails according to development level and managed use.
- Develop a management plan for the Cinder Hills OHV areas.
- Coordinate with the Great Western Trail Association and associated groups to maintain its long-distance trail opportunity.
- Complete updates to the memorandum of understanding (MOU) between the National Park Service and the Coconino NF.
- Develop interpretive plans.

- Participate in outdoor classrooms for school groups and other partnership opportunities with local schools.
- Develop education and outreach programs and/or signs to help reduce user conflicts, such as conflicts between motorized and nonmotorized users.
- Implement management actions to discourage illegal activity and/or creation of unauthorized routes.
- Implement management strategies to reduce user conflicts and address resource concerns.
- Develop interpretive sites as opportunities become available and in conjunction with partners.
- Maintain interpretive signs and exhibits.
- Distribute visitor information at Forest Service offices, visitor centers, and other locations.

Developed Recreation

- Implement vegetation management activities in developed recreation sites, including periodic reviews of vegetation health and opportunities for vegetation to provide screening or manage recreation site concerns—following the protocol for removing hazard trees, where needed. Continue an active tree planting or a regeneration program (where old, diseased, or damaged trees exist) to provide shade and scenic quality.
- Improve facilities' operating efficiency and sustainability through new construction and repairs. Consider energy efficiency through the implementation of recycled or renewable resources which produce a smaller carbon footprint.
- Complete accessibility assessments on developed recreation sites.
- Complete regular patrols at developed facilities to check for public safety, facility/resource protection, and fee compliance.

Scenic Resources

- Rehabilitate areas that do not meet or exceed their desired scenic integrity objective (SIO).
- Cooperate with other entities, such as the Arizona Department of Transportation, local governments, and commercial and private entities to protect scenic integrity on and adjacent to the forest.

Special Areas

Wilderness

- Rehabilitate wilderness sites or areas that have been impacted by recreation in order to restore wilderness character.
- Implement corrective measures, such as a wilderness permit system, if overuse causes unacceptable resource damage.
- Establish limits of acceptable change (LAC) for all wilderness areas.
- Implement various management actions to prevent bicycle use in wilderness including: ranger patrols, placement of bike racks near wilderness boundaries or portals, "wilderness

ahead" signs located outside of wilderness, improved trail design, and expanded trail opportunities outside of wilderness.

- Complete regular wilderness ranger patrols in wilderness areas.
- Develop and implement management plans for wilderness areas on the forest.
- Develop and implement management plans for any newly designated wilderness areas by 5 years after the designation occurs.

Wild and Scenic Rivers

- Coordinate with the ADEQ to monitor and achieve acceptable total maximum daily loads (TMDLs) for turbidity in the Verde River.
- Implement comprehensive river management plans for the Verde River and Fossil Creek Wild and Scenic Rivers.

Arizona National Scenic Trail

- Maintain and reroute the trail in coordination with the Arizona Trail Association and adjacent landowners.

General Crook National Recreation Trail

- Manage the 138-mile trail corridor (portion located on National Forest System land) from Fort Whipple to Fort Apache and associated historic sites and side trails for potential congressional designation as a national historic trail.
- Develop one representative visual logo for the entire trail by working with adjacent national forests and local entities.

National Scenic Byways

- Coordinate activities and design of byway facilities with the appropriate byway association and byway plan.

Research Natural Areas and Botanical and Geological Areas

- Prepare establishment reports for Rocky Gulch, West Clear Creek, and an eastern expansion of the San Francisco Peaks Research Natural Areas.
- Establish a site stewards program for onsite interpretation and monitoring of the Cottonwood Fumeroles Geological Area.

Environmental Study Areas

- Manage trails and uses in conjunction with the curriculum needs of the associated public schools.
- Develop environmental education programs cooperatively with public schools.

Appendix C. Species Crosswalk

The following is a crosswalk comparing the common, scientific, and other names attributed to plant and wildlife species discussed in the plan as of the date of publishing. Note that common names and scientific names can change frequently.

	Common Name	Scientific Name	Other Name
Amphibians/ Reptiles	Bullfrogs	*Lithobates catesbeianus*	American bullfrog
	Chiricahua leopard frog	*Lithobates chiricahuensis*	
	Leopard frogs	*Lithobates pipiens, and Lithobates yavapaiensis*	Rana species (former name)
	Lowland leopard frog	*Lithobates yavapaiensis*	Rana yavapaiensis (former name)
	Narrow-headed garter snake	*Thamnophis rufipunctatus*	
	Northern Mexican garter snake	*Thamnophis eques*	
	Toads	*Bufo microscaphus (native species)*	
Birds	American peregrine falcon	*Falco peregrinus anatum*	
	Bald eagle	*Haliaeetus leucocephalus*	
	Bell's vireo	*Vireo bellii*	
	Common black-hawk	*Buteogallus anthracinus*	
	Ferruginous hawk	*Buteo regalis*	
	Golden eagle	*Aquila chrysaetos*	
	Mexican spotted owl	*Strix occidentalis lucida*	
	Northern goshawk	*Accipiter gentilis*	
	Pygmy nuthatch	*Sitta pygmaea*	
	Southwestern willow flycatcher	*Empidonax traillii extimus*	
	Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	
	Woodpecker	*Melanerpes species, Picoides species*	
Fish	Desert sucker	*Catostomus clarki*	
	Gila trout	*Oncorhynchus gilae gilae*	
	Little Colorado spinedace	*Lepidomeda vittata*	
	Roundtail chub	*Gila robusta*	
	Spikedace	*Meda fulgida*	
Insects	Caddisflies	*Includes Atopsyche sperryi, Smicridea dispar, Polycentropus gertschi, Apatania arizona, Polycentropus arizonensis, Lepidostoma knulli, Chimarra primula, Wormaldia arizonensis, Protoptila balmorhea, Ochrotrichia ildria, Culoptila kimminsi, Ceratopsyche venada, Culoptila moselyi, Nectopsyche dorsalis, Rhyacophila chordata, Ithytrichia mexicana,*	

	Common Name	Scientific Name	Other Name
Mammals	American pronghorn	*Antilocapra americana*	Pronghorn or Pronghorn antelope
	Bats	*Includes Euderma maculatum, Idionycteris phyllotis, Lasiurus blossevillii, Myotis auriculus, Myotis occultus, Eumops perotis californicus, Corynorhinus townsendii pallescens,*	*Corynorhinus townsendii pallescens* also known as Pale lump-nosed bat. *Idionycteris* phyllotis also known as Allen's big-eared bat
	Beaver	*Castor canadensis*	American Beaver
	Black bear	*Ursus americanus*	American black bear
	Elk	*Cervus canadensis*	
	Javelina	*Pecari tajacu*	Collared peccary
	Mountain lion	*Puma concolor*	Cougar
	Mule deer	*Odocoileus hemionus*	
	Prairie dogs	*Specifically Cynomys gunnisoni*	
	Rocky Mountain bighorn sheep	*Ovis canadensis canadensis*	
	Turkey	*Meleagis gallopavo merriami*	
	White-tailed deer	*Odocoileus virginianus*	
	Wupatki pocket mouse	*Perognathus amplus cineris*	
Plants	A sedge	*Carex ultra*	
	Agave	*Agave species*	
	Alder	*Alnus oblongifolia*	Thin-leaf alder
	Alligator juniper	*Juniperus deppeana*	
	Alpine clover	*Trifolium alpinum L.*	
	Alpine timothy	*Phleum alpinum L.*	
	Apache beardtongue	*Penstemon oliganthus*	
	Arizona alder	*Aluns oblongifolia Torr.*	
	Arizona cliffrose	*Purshia subintegra*	
	Arizona cypress	*Hesperocyparis arizonica*	
	Arizona fescue	*Festuca arizonica*	
	Arizona sneezeweed	*Helenium arizonicum*	
	Arizona sycamore	*Platanus wrightii S. Watson*	
	Arizona walnut	*Juglans major (Torr.) A. Heller*	
	Ash	*Fraxinus species including F. anomala, F. cuspidate and F. velutina*	
	Baltic rush	*Juncus balticus*	
	Bebb's willow	*Salix bebbiana*	
	Bigtooth maple	*Acer gradidentatum*	
	Black grama	*Bouteloua eriopoda*	
	Blue grama	*Bouteloua gracilis*	
	Blue spruce	*Picea pungesn Engelm.*	
	Box elder	*Acer negundo*	

	Common Name	Scientific Name	Other Name
	Bristlecone pine	*Pinus aristata*	
	Catclaw mimosa	*Mimosa aculeaticarpa var. biuncifera*	
	Cherry	*Prunus species including P.emarginata, P. serotina, and P. virginiana*	
	Cliff fleabane	*Erigeron saxatilis*	
	Colorado blue columbine	*Aquilegia caerulea var. pinetorum*	
	Colorado piñon pine	*Pinus edulis*	
	Common juniper	*Juniperus communis*	
	Corkbark fir	*Abies lasiocarpa vr. arizonica*	
	Creosote bush	*Larrea tridentata*	
	Crucifixion thorn	*Canotia holacantha*	
	Deer grass	*Muhlenbergia rigens*	
	Diffuse knapweed	*Centaurea diffusa Lam.*	
	Dogwood	*Cornus sericea L.*	Redosier dogwood
	Douglas-fir	*Pseudotsuga menziesii*	
	Engelmann spruce	*Picea engelmannii*	
	Foxtail barley	*Hordeum jubatum L.*	
	Fremont cottonwood	*Populus fremontii S. Watson*	
	Galleta grass	*Hilaria jamesii*	
	Gambel oak	*Quercus gambelii*	
	Graceful buttercup	*Ranunculus inamoenus*	
	Grassyslope sedge	*Carex oreocharis*	
	Hairy grama	*Bouteloua hirsuta*	
	Hardstem bulrush	*Schoenoplectus acutus*	
	Kentucky blue-grass	*Poa pratensis*	
	Leafy spurge	*Euphorbia esula L.*	
	Limber pine	*Pinus flexilis*	
	Manna grass	*Glyceria species*	
	Manzanita	*Arctostaphylos pungens*	
	Mesquite	*Prosopsis L.*	
	Mistletoe	*Arceuthobium species*	Witches broom
	Mountain junegrass	*Koeleria pyramidata*	
	Mountain muhly	*Muhlenbergia montana*	
	Mountain mahogany	*Cercocarpus montanus*	
	Muttongrass	*Poa fendleriana*	
	Narrowleaf cottonwood	*Populus angustifolia*	
	Needle and thread grass	*Hesperostipa comata*	
	New Mexico locust	*Robinia neomexicana A. Gray*	
	Nodding brome	*Bromus anomalus*	
	One-seeded juniper	*Juniperus monosperma*	

	Common Name	Scientific Name	Other Name
	Pine dropseed	*Blepharoneuron tricholepis*	
	Ponderosa pine	*Pinus ponderosa*	
	Quaking aspen	*Populus tremuloides*	
	Red berry juniper	*Juniperus coahuilensis*	
	Red three-awn	*Aristada purpurea*	
	Rocky Mountain juniper	*Juniperus scopulorum*	
	Rusby milkvetch	*Astragalus rusbyi*	
	San Francisco Peaks ragwort	*Packera franciscanus*	*Senecio franciscanus*
	Sedges	*Carex spp.*	
	Senator Mine alumroot	*Heuchera eastwoodiae*	
	Single-leaf piñon-pine	*Pinus monophylla*	
	Southwestern white pine	*Pinus strobiformis Engelm.*	
	Spider saxifrage	*Saxifraga flagellaris*	
	Spike muhly	*Muhlenbergia wrightii*	
	Spike rush	*Eleocharis species*	
	Squirreltail	*Sitanion hystrix*	
	Subalpine fir	*Abies lasiocarpa*	
	Sumac	*Rhus L. species*	
	Sunset Crater beardtongue	*Penstemon clutei*	
	Timberland blue-eye grass	*Sisyrinchium longipes*	
	Turbinella oak	*Quercus turbinella*	
	Two-needle piñon pine	*Pinus edulis*	
	Utah juniper	*Juniperus osteosperma*	
	Verde Valley sage	*Salvia dorrii ssp. mearnsii*	
	Western wheatgrass	*Pascopyrum smithii*	
	White fir	*Abies concolor*	
	Willows	*Salix spp.*	
	Woods rose	*Merremia Dennst. Ex Endl.*	
	Yarrow	*Achillea L. species*	
Other	Chytrid fungus	*Batrachochytrium dendrobatidis*	
	Exotic spruce aphid	*Elatobium abietinum*	
	White pine blister rust	*Cronartium ribicola*	

Appendix D. Other Sources of Information

This appendix includes laws, regulations, Forest Service policy and/or direction, and it references best management practices and useful, current science (at the time of writing this plan). These sources are important in designing projects and activities to achieve desired conditions. They are organized by resource area. Most, if not all, of these relevant documents are available from Forest Service offices.

Ecosystems

Air

Executive Orders
EO 11514, 1970 Protection and enhancement of environmental quality.

Congressional Acts
Clean Air Act, as amended 1977 and 1990, Regional Haze Rule to meet PM 2.5 and ozone standards.

Forest Service Manual
FSM 2580.2 – 2580.3 Watershed and Air Management, Chapter 80 Air Resource Management, Objectives and Policy.

Other
Arizona Regional Haze Implementation Plan (http://www.azdeq.gov/function/forms/docs.html#sip); Arizona Revised Statute 49-501; Arizona Administrative Code Title 18 Chapter 2 Article 15 Forest and Range Management Burns (http://www.azdeq.gov/environ/air/smoke/download/prules.pdf).

Aquatic Systems

Executive Orders
EO 11990, 1977 Wetlands Management; EO 11998, 1977 Floodplain Management.

Congressional Acts
Federal Water Pollution Control Act of 1956 and Amendments of 1972 (Clean Water Act); Organic Administration Act, 1897 as Amended; National Forest Management Act, 1976; Safe Drinking Water Act, 1977.

Forest Service Manual
FSM 2510-2520 Watershed and Air Management, Watershed Planning and Watershed Protection and Management; FSM 2530 Water Resource Management; FSM 2540 Water Uses and Development, Regional Supplement No. 2500–2001-1; FSM 2502–2503 Watershed and Air Management, Objectives and Policy; FSM 2541.03 Water Uses and Developments, Policy; FSM 2541.12 Instream and Standing Water Requirements; FSM 2521 Watershed Protection and Management, Watershed Condition Assessment; FSM 2502 and 2503 Watershed and Air Management, Objectives and Policy; FSM 2521.11(b) Watershed Condition Assessment, Priority Setting.

Forest Service Handbook
FSH 2509.16 Water Resource Inventory Handbook; FSH 2509.22 Soil and Water Conservation Handbook, Region 3, Chapter 10–40, FSH 2509.23 Riparian Area Handbook; FSH 2509.13 Burned-Area Emergency Rehabilitation Handbook; FSM 2526, Watershed and Air Management, Riparian Area Management.

Biophysical Features

Congressional Acts
Federal Cave Resources Protection Act of 1988, 16 U.S.C. 4301–4309.

Code of Federal Regulations
36 CFR 290: Parks, Forest and Public Property, Cave Resources Management.

Forest Service Manual
FSM 2800 Minerals and Geology, Geologic Resources, Hazards and Services; FSM 2356 Cave Management.

Other
Coconino National Forest Cave Resource Management Guide

Paleontological Resources

Congressional Acts
Organic Act of 1897 (16 USC 551); Bankhead-Jones Tenant Act of 1937 (7 USC 1101); 1906 Antiquities Act[1], FS Special Uses Manual 2701.1-2; National Environmental Policy Act of 1969: 42 U.S.C. 4321, sec. 101(b).; Forest and Rangeland Renewable Resources Planning Act of 1974, as amended; 1979 Archeological Resources Protection Act; 1988 Federal Cave Resources Protection Act; PL 101-510 (H.R. 4739, sec. 2825); Paleontological Resources Preservation Act of 2009[2] (PL 111-011).

Code of Federal Regulations
7 CFR 2.60: Delegation of Authority from Secretary of Agriculture to Chief, Forest Service to regulate use and occupancy of National Forest System Lands; and to issue appropriate regulations under 36 CFR 261, Prohibitions; 43 CFR Part 3;7 CFR 3100.41(a); 36 CFR 251; 36 CFR 251.53(a) and (f) permits for vertebrate fossil collection for scientific and education purposes only; 36 CFR 261.2, 261.9(i), 261.70(a)(5): Prohibitions Section, Orders, special closures, and ability for regions to issue regulations for protection of paleontological resources; 36 CFR 228.62(e) Free-use permit may be required for limited collection of petrified wood for personal use by amateur collectors and scientists. Material cannot be bartered or sold; 36 CFR 296.5(b)(2); 36 CFR 290; 36 CFR 292.41, second definition of paleontological resources; 43 CFR 3505.11.

Forest Service Manual
FSM 2880 Geologic Resources, Hazards and Services; FS Manual 2701.1–2 Paleontological resources management under 1906 Antiquities Act; FSM 2860 Recreational collecting of mineral and fossil material under acquired lands.

Soil

Congressional Acts
Multiple Use-Sustained Yield Act of 1960; Bankhead-Jones Farm Tenant Act of 1937 as Amended.

[1] Indicates discrepancy: the 1906 Antiquities Act does not cover paleontological resources according to the courts.

[2] The Forest Service, along with other interagency partners and scientists, is developing implementing regulations for the Paleontological Resources Preservation Act of 2009.

Forest Service Manual
FSM 2550 Watershed and Air Management, Chapter 50, Soil Management.

Forest Service Handbook
FSH 2509.18; Soil Management Handbook; FSH 2509.22, Soil and Water Conservation Handbook.

Vegetation

Congressional Acts
Organic Act of 1897 (16 U.S.C. 475, 551); Organic Administration Act of 1897 (16 U.S.C. 475, 551); Weeks Law of 1911, as amended (16 U.S.C. 515, 552); Knutsen-Vandenberg Act of 1930 (16 U.S.C. at 576b); Anderson-Mansfield Reforestation and Revegetation Joint Resolution Act of 1949 (16 U.S.C. 581j and 581j(note)); Granger-Thye Act of 1950 (16 U.S.C. at 580g-h); Surfaces Resources Act of 1955 (30 U.S.C. 611-614); Sikes Act (Fish and Wildlife Conservation) of September 15, 1960 (16 U.S.C. at 670g); Multiple-Use Sustained Yield Act of 1960 (MUSYA) (16 U.S.C. 528-531); Wilderness Act of 1964 (16 U.S.C. §§ 1131 et seq.); Wild and Scenic Rivers Act (82 Stat. 906, as amended, 16 U.S.C. 1271 (note), 1271-1287); National Environmental Policy Act (NEPA) of 1969 (16 U.S.C. 4321 et seq.); Endangered Species Act of 1973 (P.L. 93-205, 87 Stat. 884; 16 U.S.C. 1531–1544, as amended); Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974, as amended by National Forest Management Act (NFMA) of 1976 (16 U.S.C. 1600–1614, 472a); Clean Water Act of 1977 (33 U.S.C. 1251, 1254, 1323, 1324, 1329, 1342, 1344; 91 Stat. 1566); Clean Air Act, as amended 1977 and 1990 (42 U.S.C. 7401, 7418, 7470, 7472, 7474, 7475, 7491, 7506, 7602); North American Wetland Conservation Act of 1989 (16 U.S.C. 4401 (note), 4401–4413, 16 U.S.C. 669b (note)); Healthy Forests Restoration Act (HFRA) of 2003 (16 U.S.C. at 1611–6591).

Executive Orders
EO 11514 Protection and enhancement of environmental quality; EO 11644 Use of off-road vehicles on the public lands; EO 11988 Floodplain management; EO 11990 Protection of wetlands; EO 13112 Invasive Species.

Code of Federal Regulations
35 CFR 4247 Protection and enhancement of environmental quality; 37 CFR 2877 Use of off-road vehicles on the public lands; 42 CFR 26951 Floodplain management; 42 CFR 26961 Protection of wetlands; 64 CFR 6183 Invasive Species.

Forest Service Manual
FSM 5100-5190; FSM 2020.

Wildlife, Fish, Botany

Executive Orders
EO 13186, Responsibility of Federal Agencies to Protect Migratory Birds.

Congressional Acts
Bankhead-Jones Farm Tenant Act of 1937; Multiple Use-Sustained Yield Act of 1960; National Forest Management Act of 1976; Endangered Species Act of 1973; Migratory Bird Treaty Act of 1918; Sikes Act of 1960; 3150.2 State and Private Forestry, Rural Community Fire Protection Program, Objectives; Federal Noxious Weed Act of 1975.

Code of Federal Regulations
36 CFR 241.2 Parks, Forests, and Public Property, Fish and Wildlife, Cooperation in Wildlife Management.

Forest Service Manual
FSM 2402 Timber Management, Objectives; FSM 2470.2–2470.3 Timber Management, Chapter 70 Silvicultural Practices, Objectives and Policy; FSM 2670–2671Wildlife, Fish, and Sensitive Plant Habitat Management, Chapter 70, Threatened, Endangered, and Sensitive Plants and Animals, Cooperation; FSM 2671.45 C & F 2671Wildlife, Fish, and Sensitive Plant Habitat Management, Interim Directives; FSM 3110.2 State and Private Forestry, Cooperative Forest Fire Prevention, Objectives.

Other
1982 Rule Provisions, Sections 219.13–219.26; U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee Recommendations to the Secretary, March 4, 2010; Avian Power Line Interaction Committee Guidelines; *Hedeoma diffusum* Management Plan (1984); *Cimicifuga Arizonica* Conservation Plan (1995); San Francisco Peaks Alpine Tundra Management Plan (1984).

Invasive Exotic Species

Executive Orders
EO 13112, Wetlands Management.

Congressional Acts
Federal Noxious Weed Act of 1974, P.L. 93–629, as amended;

Forest Service Manual
FSM 2080.5, Noxious Weed Management; FSM 2150, Pesticide-Use Management and Coordination.

Other
Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1947; National Strategy and Implementation Plan for invasive Species Management, FS-805 (2004); U.S. Forest Service Invasive Species Program Web site: http://www.fs.fed.us/invasivespecies/index.shtml.

People and the Landscape

Fire Management

Congressional Acts
National Environmental Policy Act of 1969; National Forest Management Act of 1976; Federal Land Assistance, Management, and Enhancement (FLAME) Act of 2009.

Forest Service Manual
FSM 5110.2 Fire Management, Wildfire Prevention, Objective; FSM 5120 Fire Management, Preparedness; FSM 5130.2 Wildland Fire Suppression, Objective; Managing Impacts of Wildfires on Communities and the Environment, and Protecting People and Sustaining Resources in Fire Adapted Ecosystems – A Cohesive Strategy (FSM 5101, 5103, and 5108); FSM 5140.2 Fire Use, Objectives; FSM 5140.3 Fire Use, Policy; FSM 5171, Agreements with Federal Agencies; Interagency Prescribed Fire, Planning and Implementation Procedures Guide, Element 19-Smoke Management & Air Quality (USDA, USDOI) 2008; Guidance for Implementation of Federal Wildland Fire Management Policy, 2009; FSM 3110.2

Cooperative Forest Fire Prevention, Objective; FSM 3110.3 Policy (Smokey Bear); FSM 2324.2 Wilderness Management, Management of Fire; FSM 5100, Fire Management.

Forest Service Handbook
FSH 5109.19 Chapter 50 Fire Management Analysis and Planning Handbook, Fire Management Planning.

Other
The 1995/2001 Federal Wildland Fire Management Policy and Program Review; The Wildland and Prescribed Fire Management Policy and Implementation Procedures Reference Guide; The Interagency Fire Management Plan template by the Fish and Wildlife Service, 2006 www.fws.gov/fire/fmp/development/July08_FWS_template_guidance.doc; National Cohesive Wildland Fire Management Strategy; USDOI, National Fire Plan, 2001. The Coconino National Forest Fire Management Plan, 2010; Community Wildfire Protection Plans (CWPP) for Flagstaff and surrounding communities, Blue Ridge and Mogollon Rim communities, Greater Williams Area, and the Tusayan community, and the Rim Country communities.

Livestock Grazing

Congressional Acts
Bankhead Jones Farm Tenant Act of 1937.

Code of Federal Regulations
36 CFR 213 Administration of Lands under Title III of the Bankhead-Jones Farm Tenant Act by the Forest Service.

Forest Service Manual
FSM 2202 Range Management, Objectives; FSM 2230.2 and 2230.3 Grazing and Livestock Use Permit System, Objective and Policy; FSM 2231.02 Grazing and Livestock Use Permit System, Requirements for Permits with Term Status; FSM 2240.2 and 2240.3 Range Improvements, Objective and Policy; FSM 2242.02 Structural Range Improvements, Objective; FSM 2242.03 Policy; FSM 2243.02 Nonstructural Range Improvements, Objective; FSM 2243.03 Policy; FSM 2250.2 and 2250.3 Range Cooperation, Objective and Policy; FSM 2270.3 Information Management and Reports, Policy; FSM 2237.03 Range Management, Policy; FSM 2541.03 Water Uses and Development, Policies; FSM 2253.4 Range Cooperation, Cooperation with Others; FSM Information Management and Reports, Policy.

Forest Service Handbook
FSH 2209.13, Chapter 12.31 Grazing Permit Administration Handbook, Permits with Term Status, Upper Limits; FSH 2209.13 Chapter 90 Rangeland Management Decision-Making.

Other
Interagency Technical Reference (USDA, USDOI), Utilization Studies and Residual Measurements, 1996; Technical Reference 4400-5 Rangeland Inventory & Monitoring, Supplemental Studies, 1992; Technical Reference 4400-7 (BLM) Rangeland Monitoring Analysis, Interpretation, and Evaluation, 1985; Technical Reference 4400-8 (BLM) Rangeland Monitoring, Statistical Considerations, 1992.

Forest Products

Congressional Acts
National Environmental Policy Act of 1969; National Forest Management Act of 1976.

Code of Federal Regulations
36 CFR 223.5 through 36 CFR 223.10 Parks, Forests, and Public Property, Scope of Free-Use Granted to Individuals, Cutting and Removal of Timber in Free-Use Areas, Permission for Free-Use of Timber Outside Free-Use Areas, Delegations of Authority to Approve Free Use by Individuals, Free-Use to Owners of Certain Mining Claims, Free-Use to Alaskan Settlers, Miners, Residents, and Prospectors; 36 CFR 223.2 Disposal of Timber for Administrative Use; 7 CFR 2.60 Agriculture, Chief, Forest Service; 36 CFR 223.12 Permission to Cut, Damage, or Destroy Trees without Advertisement; 36 CFR 800, National Historic Preservation Act; 36 CFR 223.261 Sale and Disposal of National Forest System Timber; Special Forest Products and Forest Botanical Products.

Forest Service Manual
FSM 2000, Chapter 2020.12(5), Ecological Restoration and Resilience, Executive Orders; Chapter 2020.3(2) Policy; FSM 2400, Timber Management, Chapter 2462, Free Use of Timber; Chapter 2463, Administrative Use; FSM 2400, Chapter 2467 Sales of Special Forest Products, 36 CFR 223.1 Authority to Sell Timber; FSM 2400, Chapter 2431 Management of Timber Sale Program.

Forest Service Handbook
FSH 2409.18, Timber Sale Preparation; Section; FSH 2409.18-2009-2, Section 82.5 Trees, Portions of Trees, or Forest Products Free of Charge for Indian Tribes for Non-Commercial Traditional and Cultural Purposes; FSH 2409.19 Renewable Resources Handbook; FSH 1909.15, Environmental Policy and Procedures Handbook; FSH 2409.19, Timber Sale Administration Handbook.

Other
Forest Service National Resource Guide to American Indian and Alaska Native Relations, 12/05/1997; Tribal Consultation on Section 8105 of the Food, Conservation and Energy Act of 2008 (The Farm Bill); 16 U.S.C.2104 Note Stewardship End Result Contracting Projects.

Energy and Minerals

Code of Federal Regulations
36 CFR 228 Subpart E, Oil and Gas Resources.

Forest Service Manual
FSM 2320 Wilderness Management; FSM 2802 and 2803 Minerals and Geology, Objectives and Policy; FSM 2814 Mining Claims, Rights, and Obligations of the United States; FSM 2822.41 Mineral Licenses, Permits, and Leases Administer by the Department of the Interior, Forest Service Evaluation and Report; 36 CFR 228 Minerals; FSM 2850 Mineral Materials; Surface Occupancy Standards and Guidelines for Oil and Gas Exploration and Development (the Gold Book) published by BLM; FSM 2822.62, Actions by Forest Service; FSM 2814.01, Mining Claims, Rights of United States; FSM 2814.23 Prevent Violations of Laws and Regulations; FSM 2822.02 Mineral Leases, Permits, and Licenses, Objective; FSM 2822.04 Responsibility; FSM 2880.3 Geologic Resources, Hazards and Services, Policy.

Heritage Resources, Tribal Relations, and Uses

Executive Orders
EO 13175 Consultation and Coordination with Indian Tribal Governments; EO 13007 Indian Sacred Sites; EO 13007 Indian Sacred Sites; EO 13287 Preserve America, (Partnering to Promote Heritage Tourism in Communities: Guidance for Federal Agencies, 2003); EO 11593 Protection and Enhancement of the Cultural Environment.

Congressional Acts
National Historic Preservation Act Sections 106 and 110; The Native American Grave Protection and Repatriation Act; American Indian Religious Freedom Act, 1978; Archaeological Resources Protection Act, 1979; Food Conservation and Energy Act of 2008 (The Farm Bill).

Code of Federal Regulations
36 CFR 800 Protection of historic Properties; 36 CFR 60.4 National Register of Historic Places, Criteria for Evaluation.

Forest Service Manual
FSM 2360 Heritage Program Management; FSM 2360.7 Heritage Program Management, Program Funding Structure; FSM 2364.03 Protection and Stewardship, Policy; FSM 2364.02 Objectives, American Indian Religious Freedom Act, 1978; FSM 2360.7 Heritage Program Management, Program Funding Structure; FSM 2364.03 Protection and Stewardship, Policy; FSM 2364.02 Objectives.

Other
Region 3, First Amended Programmatic Agreement Regarding Historic Property protection and Responsibilities (and associated appendices), December 2003; U.S. Forest Service Tribal Relations Strategic Plan.

Roads and Facilities

Code of Federal Regulations
36 CFR 212 Travel Management; 36 CFR 261 Prohibitions.

Forest Service Manual
FSM 5460 Right-of-Way Acquisition; FSM 7701.2 Travel Management; FSM 7702 Travel Management, Objectives; FSM 7703 Travel Management, Policy; FSM 7710 Travel Management, Travel Planning; FSM 7730 Road Operation and Maintenance.

Forest Service Handbook
FSH 2509.22 Soil and Water Conservation Handbook; FSH 7709.55 Travel Planning Handbook; FSH 7709.56 Road Preconstruction Handbook; FSH 7709.59 Road System Operations and Maintenance Handbook.

Other
Forest Service Washington Office correspondence dated November 10, 2010, RE: Travel Management, Implementation of 36 CFR, Subpart 212, Subpart A (36 CFR 212.5(b); Forest Service Washington Office correspondence RE: Fiscal Year 2010 Final Program Direction.

Lands Adjustments

Code of Federal Regulations
36 CFR 254 Landownership Adjustments.

Forest Service Manual
FSM 5400 Landownership; FSM 2354.51(a) Fee Title Acquisition on Designated Rivers; FSM 2354.6 Non-designated Rivers.

Forest Service Handbook
FSH 5409.12 Appraisal Handbook; FSH 5409.13 Land Acquisition Handbook; FSH 5409.17 Rights-of-Way Acquisition Handbook; FSH 5509.11Title Claims, Sales, and Grants Handbook.

Special Uses

Congressional Acts
Act of 1866 General Mining Law; Act of March 3, 1925 (43 Stat. 1133, as amended); The Act of March 4, 1915, as amended July 28, 1956, (16 U.S.C. 497); The Act of November 16, 1973, (30 U.S.C. 185), amending Section 28 of the 1920 Mineral Leasing Act; Alaska National Interest Lands Conservation Act, 1980; An Act to Repeal Timber-Culture Laws, 1891; Archaeological Resources Protection Act of 1979; Bankhead-Jones Farm Tenant Act of 1937, Section 31-33; Colorado Ditch Act of 1986 (FLPMA amendment; Energy Policy Act of 2005; Education Land Grant Act; Exchange for Schools Act (Sisk Act) of December 4, 1967 (81 Stat. 531, as amended; 16 U.S.C. 484a, 521c-521i); Federal Land Policy and Management Act of 1976; Forest Service Facilities Realignment Act of 2005 (119 Stat 559-563; 16 U.S.C. 580d, as amended); General Exchange Act of 1922; Granger-Thye Act of 1950, section 7; Highway Act of August 27, 1958, (23 U.S.C. 317), supplemented by the Act of October 15, 1966 (49 U.S.C. 1651); Land and Water Conservation Fund Act of September 3, 1964; Mineral Leasing Act of 1920, as amended on November 16, 1973, (30 U.S.C. 185(1)); National Forest Roads and Trails Act 1964; Oil and Gas Pipeline amendment to the Mineral Leasing Act, Section 28 authorizes oil and gas pipelines; Organic Act of 1897 provides for rules to regulate occupancy and use of the Forest Reserves; Occupancy Permits Act (March 4, 1915); Preservation of American Antiquities Act of June 8, 1906; Small Tracts Act of January 12, 1983 (96 Stat. 2535; 16 U.S.C. 521c-i); Telecommunications Act of 1996 (Public Law 104-104); Term Permit Act of March 4, 1915, amended July 28, 1956; National Forest Townsite Act of July 31, 1958 (72 Stat. 483; 7 U.S.C. 1012a; 16 U.S.C. 478a) as amended by Section 213 of the Federal Land Policy and Management Act of 1976 (90 Stat. 2760); Water Conveyance Act of 1986 amended FLMPA; Weeks Law of March 1, 1911(36 Stat. 961 as amended; 16 U.S.C. 516).

Executive Orders
EO 11990 Wetlands; EO 11988 Floodplains.

Code of Federal Regulations
36 CFR 251 Subpart B Land Uses, Special Uses; 36 CFR 254, subpart A.

Forest Service Manual
FSM 2700 Special Uses Management.

Forest Service Handbook
FSH 2709.11 Special Uses Handbook.

Other
Interim Guidelines to Avoid and Minimize Wildlife Impacts from Wind Turbines (FWS direction) (these guidelines will be superseded by the guidelines developed by the U.S. Fish and Wildlife Service Wind Turbine Guidelines Advisory Committee, once they are finalized and adopted by the Secretary of the Interior); Suggested Practices for Raptor Protection on

Power Lines: The State of the Art in 2006, Avian Powerline Interaction Committee (APLIC) 2006; Edison Electric Institute, Washington, DC. Standard Guidance for Towers with Potential Impacts to Federally-Listed Species and Migratory Birds (document prepared by the U.S. Fish and Wildlife Service).

Recreation

Dispersed Recreation

Code of Federal Regulations
36 CFR 212, Travel Management; 36 CFR 251, Land Uses; 36 CFR 261, Prohibitions; 36 CFR 294, Special Areas.

Forest Service Manual
FSM 1802 and 1803 Senior, Youth and Volunteer Programs, Objectives and Policy.

Forest Service Handbook
FSH 2309.18.4Trails Management Handbook; FSM 2300, Recreation, Wilderness, and Related Resource Management.

Other
1987 Coconino National Forest Land and Resource Management Plan, as Amended; Coconino National Forest Motor Vehicle Use Map; Travel Management Rule, 2005.

Developed Recreation

Congressional Acts
National Trails System Act, 2009.

Code of Federal Regulations
36 CFR 213 Administration of Lands under Title III of Bankhead-Jones Farm Tenant Act by the Forest Service; 36 CFR 261Prohibitions; EO 11988 Floodplain Management.

Forest Service Manual
R3 Supplement to FSM 2300 Recreation, Wilderness, and Related Resource Management; FSM 2310 Planning and Data Management; FSM 2311 Resource Opportunities in Recreation Planning; FSM 2330.3 Publicly Managed Recreation Opportunities, Policy; FSM 2353.16 Trail, River and Similar Recreation Opportunities; Cooperative Agreements and Rights-of-Way; FSM 2390 Interpretive Services; FSM 5340.2 Law Enforcement, Objectives; FSM 5420 Land Purchases and Donations; FSM 7151.02 Land Surveying, Objectives; FSM 7312.1 and 7312.2 Facility Planning, Plans, and Preliminary Project Analysis; FSH 7309.11 Ch 40 Buildings and Related Facilities, Management; Forest Service Outdoor Recreation Accessibility Guidelines; FSM 7400 Public Health and Pollution Control Facilities.

Forest Service Handbook
FSH 7409.11, Sanitary Engineering and Public Health Handbook; Forest Service Outdoor Recreation Accessibility Guidelines, 5/22/2006; FSM 2303 Recreation, Wilderness and Related Resource Management, Policy; FSM 2334 Recreation, Wilderness, and Related Resource Management, Campgrounds and Picnic Grounds.

Scenic Resources

Code of Federal Regulations
36 CFR 213.3 Part B Administration of Lands under Title III of the Bankhead-Jones Farm Tenant Act by the Forest Service: Protection, occupancy, use, administration, and exercise of reservations.

Forest Service Manual
FSM 2380.13 Landscape Management, Scenic Trails and Byways; FSM 2380.6- 2380.62 Technical Publications and References, Current Publications, Superseded Reference; FSM 2380.14 Landscape Management, Wild and Scenic Rivers; FSM 2380.18 Landscape Management, Landownership Adjustments ; FSM 2380.3 Landscape Management, Policy; FSM 2380.31 Landscape Management, Resource Planning and Management; FSM 2380.43 Landscape Management, Responsibility, Forest Supervisor; FSM 2382.1 Landscape Management, Scenery Management, Scenery Management System.

Forest Service Handbook
Landscape Aesthetics Handbook (US Forest Service Agriculture Handbook No. 701); FSH 1909.12 (13.13a).

Special Areas

Wilderness Areas

Congressional Acts
1964 Wilderness Act.

Forest Service Handbook
FSH 1909.12 Chapter 70 Wilderness Evaluation, Subsection 71.1 Criteria for Including Improvements; FSH 1909.12 Chapter 70 Wilderness Evaluation, Subsection 72.1 Capability; FSH 1909.12, FSH 1909.12 Chapter 70 Wilderness Evaluation, Subsection 72.3 factors to consider.

Other
Monitoring Selected Conditions Related to Wilderness Character: A National Framework, USDA Forest Service, Rocky Mountain Research Station, General Technical Report RMRS-GTR-151.

Wild and Scenic Rivers

Congressional Acts
Wild and Scenic Rivers Act of 1968.

Forest Service Manual
FSM 2354.02 Trail, River, and Similar Recreation Opportunities, Objective; FSM 2354.03 Trail, River, and Similar Recreation Opportunities, Policy; FSM 2354.04 Trail, River, and Similar Recreation Opportunities, Responsibility; FSM 2354.21 Recreation, Wilderness, and Related Resource Management, Management of Study Rivers; FSM 2354.42 (a-p) Wild and Scenic River Resource Protection and Management.

Other
Wild and Scenic River Comprehensive River Management Plans.

National Trails and Scenic Byways

Congressional Acts
National Historic Preservation Act Sections 106 and 110; National Trails System Act of 1968; Transportation Equity Act for the 21st Century of 1998, or most recent reauthorizing legislation.

Code of Federal Regulations
36 CFR 800 Parks, Forests, and Public Property, Advisory Council on Historic Preservation; 36 CFR 60.4 National Register of Historic Places, Criteria for Evaluation.

Forest Service Manual
FSM 2300 Recreation, Wilderness, and Related Resource Management; FSM 2353.11 Recreation, Wilderness, and Related Resource Management, Chapter 50 Trail, River, and Similar Recreation Opportunities, Relationship Between National Recreation, National Scenic, and National Historic Trails and NFS Trails; FSM 2380.13 Landscape Management, Scenic Trails and Byways.

Research Natural Areas (RNA), and Botanical and Geological Areas

Forest Service Manual
FSM 4063.02 Research Natural Areas, Objectives & FSM 4063.03 Research Natural Areas, Policy; FSM 4000 Research and Development, Chapter 4060, Research Facilities and Areas, Policy; FSM 2880 Geologic Resources, Hazards and Services, Chapter Section 2882.8 Special Interest Areas and Research Natural Areas; FSM 2300 Recreation, Wilderness and related Resource Management, Chapter 2370 Special Recreation Designations.

Other
RNA Establishment Reports.

Appendix E. Index of Other Supporting Plan Documentation

The following documents significantly contributed to development of the plan components (i.e., desired conditions, objectives, standards, guidelines, suitability, and monitoring) and/or are evaluations which were required by the 1982 planning rule provisions.

Document	Location	Index Number
Analysis of the Management Situation (AMS)	Coconino National Forest Planning Web site - Analysis of Management Situation and Sustainability Reports	To be added for final plan.
Ecological Sustainability Report (ESR)	Coconino National Forest Planning Web site - Analysis of Management Situation and Sustainability Reports	To be added for final plan.
Economic and Social Sustainability Assessment (ESSA)	Coconino National Forest Planning Web site - Analysis of Management Situation and Sustainability Reports	To be added for final plan.
Final Environmental Impact Statement for Integrated Treatment of Noxious or Invasive Weeds on the Coconino, Kaibab, and Prescott National Forests	Coconino National Forest Web site - Past Projects Archive	To be added for final plan.
Southwestern Region Climate Change Trends and Forest Planning	Rocky Mountain Research Station Web site – Publications Archive	To be added for final plan.
Public Collaboration and Involvement/Other Planning Efforts	Appendix B in the Draft Environmental Impact Statement for the Coconino National Forest Land and Resource Management Plan	To be added for final plan.
Potential Wilderness Area Evalution	Coconino National Forest Planning Web site – Documents Archive	To be added for final plan.
Wild and Scenic River Eligibility Evaluation	Coconino National Forest Planning Web site – Documents Archive	To be added for final plan.
Research Natural Areas Evaluations	Coconino National Forest Planning Web site – Documents Archive	To be added for final plan.